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SURVEY

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MINERAL RECONNAISSANCE PROGRAMME  
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## Rare Earth Elements in Alkaline Intrusions, North-West Scotland

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Keyworth, Nottingham British Geological Survey 1993

## RARE EARTH ELEMENTS IN ALKALINE INTRUSIONS, NORTH-WEST SCOTLAND

Data for the rare earth elements (REE) Ce, La and Y are presented for rock and drainage samples from three late Caledonian alkaline intrusions of north and north-west Scotland. The neighbouring Loch Borraran and Loch Ailsh intrusions were investigated in the late 1980's for the platinum group elements (PGE), and samples were also analysed for the REE. The Ben Loyal Complex, situated 50 km to the north-east, was investigated for the REE on the basis of archived mineralogical and geochemical information. These investigations were carried out as part of the Mineral Reconnaissance Programme (MRP) and commissioned by the Department of Trade and Industry.

### Introduction

The alkaline intrusive complexes studied for this report are of late Caledonian age and were emplaced along the north-west margin of the Caledonian fold belt. Thirlwall (1988), suggests ages of 439 ( $\pm 4$ ) Ma at Loch Ailsh, 430 ( $\pm 4$ ) Ma at Loch Borraran and 426 ( $\pm 9$ ) Ma for the Cnoc nan Cuilean intrusion of the Ben Loyal suite, using U-Pb zircon isotopic dating.

All three intrusions display geochemical characteristics indicative of fractional crystallisation from a lithospheric mantle source. The progression from melanocratic syenites to more evolved leucosyenites is indicative of this fractionation. Localised metasomatism and assimilation of the country rock is evident at Loch Borraran and Loch Ailsh and around the Cnoc nan Cuilean intrusion at Ben Loyal. Ultramafic rocks occur in both the Loch Borraran and Loch Ailsh Complexes, and were investigated for the PGE due to the potential for primary magmatic enrichment of these elements. The Ben Loyal Complex does not contain rocks of comparable type and was not therefore investigated for the PGE.

Analysis for the REE and a range of other elements was undertaken by the Analytical Geochemistry Group of the BGS by X-ray fluorescence spectrometry (XRF). A complete list of analytical results for the Loch Borraran boreholes, together with graphic logs, is published in MRP Open File Report No. 10.

### Loch Borraran

Investigation for the PGE at Loch Borraran was undertaken initially in 1988-89 by geochemical analysis of drill core from 37 shallow boreholes (Figure 1). The boreholes had been drilled 10 years earlier as part of an evaluation of the phosphate potential of the apatite-rich 'early suite' of biotite-melanite and phlogopite pyroxenites. The apatite occurs largely as subhedral to euhedral primary interstitial growths, usually in the order of several mm in size. The presence of REE in the apatite was established during the phosphate investigations by XRF. A total of 695 core samples were selected for analysis. Enhanced levels of the PGE were identified in a number of borehole sections, up to a maximum of 878 ppb combined Pt+Pd.

A second phase of drilling was undertaken in 1990. Its main purpose was to investigate the margins of the pyroxenite for any potential upgrading of the PGE in a structural setting and to elucidate the distribution of the PGE by deeper drilling. Four boreholes were drilled in the northern part of the early suite (Figure 1, holes 1-4). Following detailed logging, a further 524 samples were selected for analysis from three of these boreholes.

A summary table for the REE is shown below, and full results are presented in Tables 1-4. Minor enrichments in the REE occur in several borehole intersections, with pyroxenites and syenites from

Borehole 2 giving the highest values (up to 739 ppm La and 1764 ppm Ce). Borehole logs indicate localised concentrations of primary apatite up to 2%, which makes it the most abundant rare earth containing mineral. The distribution pattern of Y is closely related to Zr (Spearman ranked correlation coefficient of 0.77 for 202 samples from Borehole 2). Zircon occurs as an accessory in all the pyroxenites, and the melanite-pyroxenite of Borehole 2 is the most enriched in these elements.

Maximum REE values for Loch Borrallan boreholes

Borehole No.	La (ppm)	Ce (ppm)	Y (ppm)
0.75	143	316	48
01.0	378	561	36
10.1021	123	318	49
10.600	147	415	128
10.650	177	477	194
10.725	197	687	83
10.800	117	359	50
10.875	111	329	41
10.950	114	337	42
12.1000	118	344	53
12.650	126	463	604
12.700	192	734	134
12.800	139	409	66
12.900	176	572	71
14.700	104	370	99
14.800	112	380	67
14.850	111	320	51
14.900	105	295	47
16.660	109	254	43
16.750	182	548	298
16.875	125	394	129
18.720	206	689	231
18.993	130	316	73
2.50	107	492	75
20.720	141	533	449
22.720	106	275	49
4.200	105	265	52
4.305	121	528	699
4.480	169	465	74
4.680	50	104	23
6.500	120	347	96
6.600	126	418	88
6.690	109	364	49
6.840	207	430	36
8.630	147	612	238
8.720	83	217	34
Phase 2, Borehole 2	739	1764	986
Phase 2, Borehole 3	219	499	117
Phase 2, Borehole 4	255	657	371

## **Loch Ailsh**

Following the discovery of significantly enhanced levels of the PGE at Loch Borralan, investigations were extended during the summers of 1989 and 1990 to the nearby Loch Ailsh intrusion. Lithochemical and drainage reconnaissance were used to define areas for detailed study.

The majority of rock samples were collected from surface exposures along the course of the Allt Cathair Bhan and adjacent ridges. A number of targets for mineralisation which had been defined by geophysics were also investigated by manual pitting. Drainage sampling was extended throughout the Complex in order to define other poorly exposed targets. The locations of rock and drainage sites are shown in Figure 2.

Mean levels of La and Ce in rocks are similar to those from Loch Borralan. One zone in the Allt Cathair Bhan (Figure 2 inset) shows a marked enrichment, up to maxima of 3239 ppm La and 3956 ppm Ce in syenite and 840 ppm La and 1456 ppm Ce in pyroxenite. These rocks are also enriched in Th (maximum 244 ppm) and U (maximum 65 ppm).

There is again a significant Spearman ranked correlation between Y and Zr in 58 pyroxenite samples (0.64), but not in the 78 syenite samples collected (0.14). Instead, Y is associated with La, Ce, Fe, Zn, Ti, Mn, V and Ca, all correlations (>0.42) significant at the 99.9% confidence level. This association between the REE suggests the presence of other rare earth minerals, possibly including allanite which is a characteristic accessory mineral in syenite. Samples of Durness limestone (marble) have the lowest levels of the REE, but these and the skarns derived from them locally show minor enrichment, probably as a result of metasomatic reaction.

Stream sediment samples were wet screened in the field through 150 micron aperture mesh to produce approximately 50g of sample. Pan concentrates were processed from 4 kg of -2 mm material. This volume was reduced using a standard panning technique to produce 150 ml of heavy mineral concentrate.

A total of 24 stream sediment and panned concentrate samples were collected. Levels of La and Ce are similar to those in rocks in both sample types. Higher Y levels in panned concentrates than in rocks or stream sediments are consistent with upgrading of zircon in the heavy mineral fraction. Samples from one site (8003), situated close to the anomalous rock site PGR 8084, contained significantly enhanced levels of La and Ce in both stream sediments and panned concentrates.

## **Ben Loyal**

In September 1990 a short reconnaissance survey to investigate occurrences of rare earth minerals was carried out over the Ben Loyal and Cnoc nan Cuilean intrusions. The locations of rare earth minerals identified from earlier BGS investigations are shown in Figure 4. Although most of these localities were investigated, the upper sheeted contact zone of the Ben Stumanadh portion of the intrusion could not be investigated due to time constraints. A total of 14 rocks and 8 stream sediment and panned concentrate samples was collected.

A marked REE enrichment occurs in two rock samples from the Cnoc nan Cuilean intrusion. The highest recorded levels (5667 ppm La and 19785 ppm Ce) were from a sample of heterogeneous basic syenite from the upper reaches of the Allt Liath catchment [261500 946090]. Minor enhancements are found in samples from the Ben Loyal intrusion.

Enhanced levels of the REE are found in both stream sediment and panned concentrate samples collected in catchments draining the Allt Liath area. The results, up to maxima of 1409 ppm Ce in panned concentrates and 1922 ppm Ce in stream sediments are the highest recorded in drainage samples during this study. This anomaly may be due to the single bedrock anomaly described above or else be the product of other REE mineralisation in that part of the Cnoc nan Cuilean intrusion.

#### **Reference**

THIRLWALL, M F. 1988. Geochronology of Late Caledonian magmatism in northern Britain. *Journal of the Geological Society of London*, Vol. 145, 951-967.

## **FIGURES**

Figure 1 Locations of Loch Borralan boreholes

Figure 2 Locations of rock and drainage samples in the Loch Ailsh project area

Figure 3 Geological map of the Loch Ailsh intrusion

Figure 4 Geology and sample site location map of the Ben Loyal Complex

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Table 3 Loch Borralan Borehole 3

Table 4 Loch Borralan Borehole 4

Table 5 Loch Ailsh rocks

Table 6 Loch Ailsh stream sediments

Table 7 Loch Ailsh panned concentrates

Table 8 Ben Loyal rocks

Table 9 Ben Loyal stream sediments

Table 10 Ben Loyal panned concentrates

Table 11 Major rock type code classifications

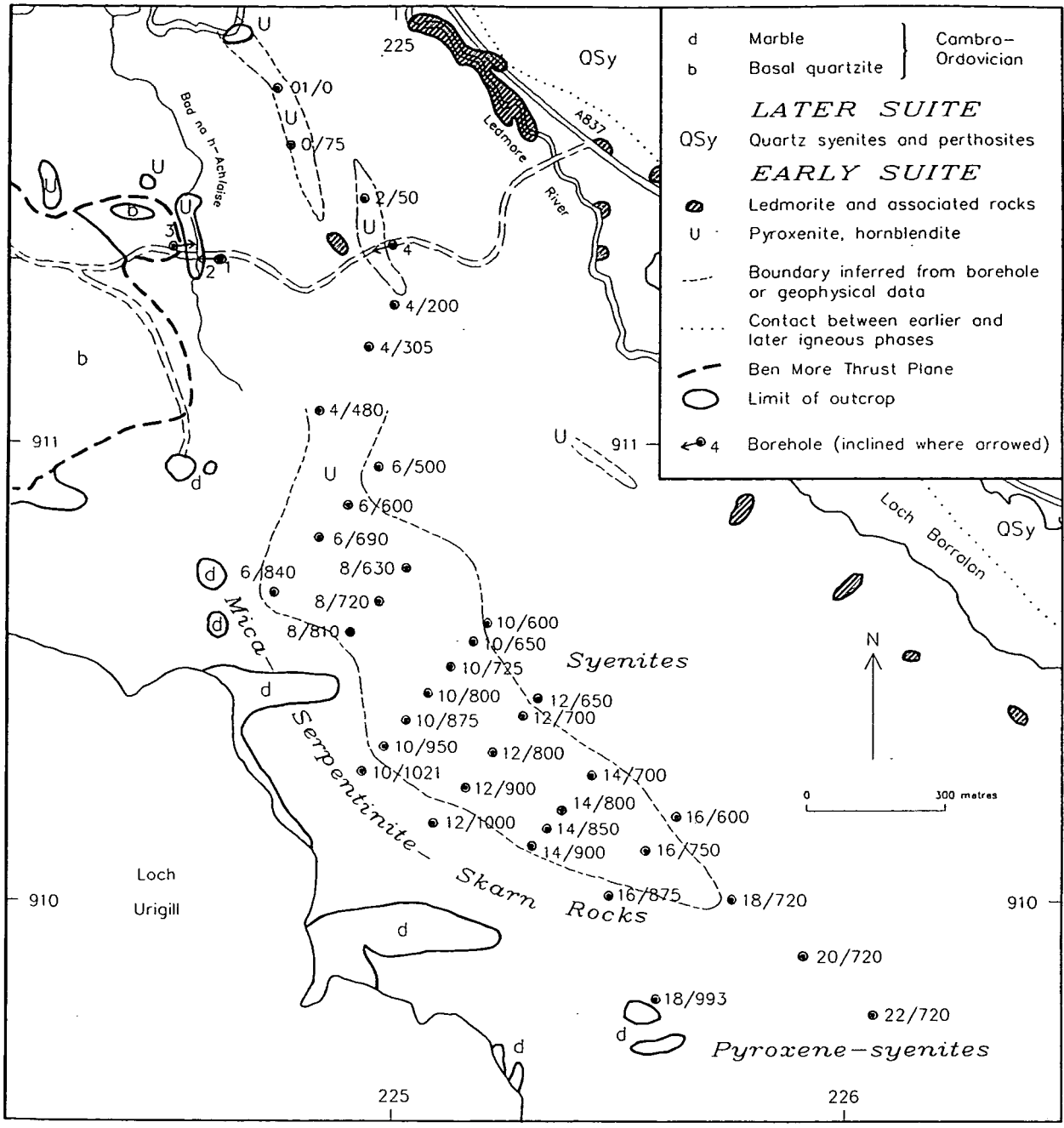


Figure 1 Locations of Loch Borrallan boreholes

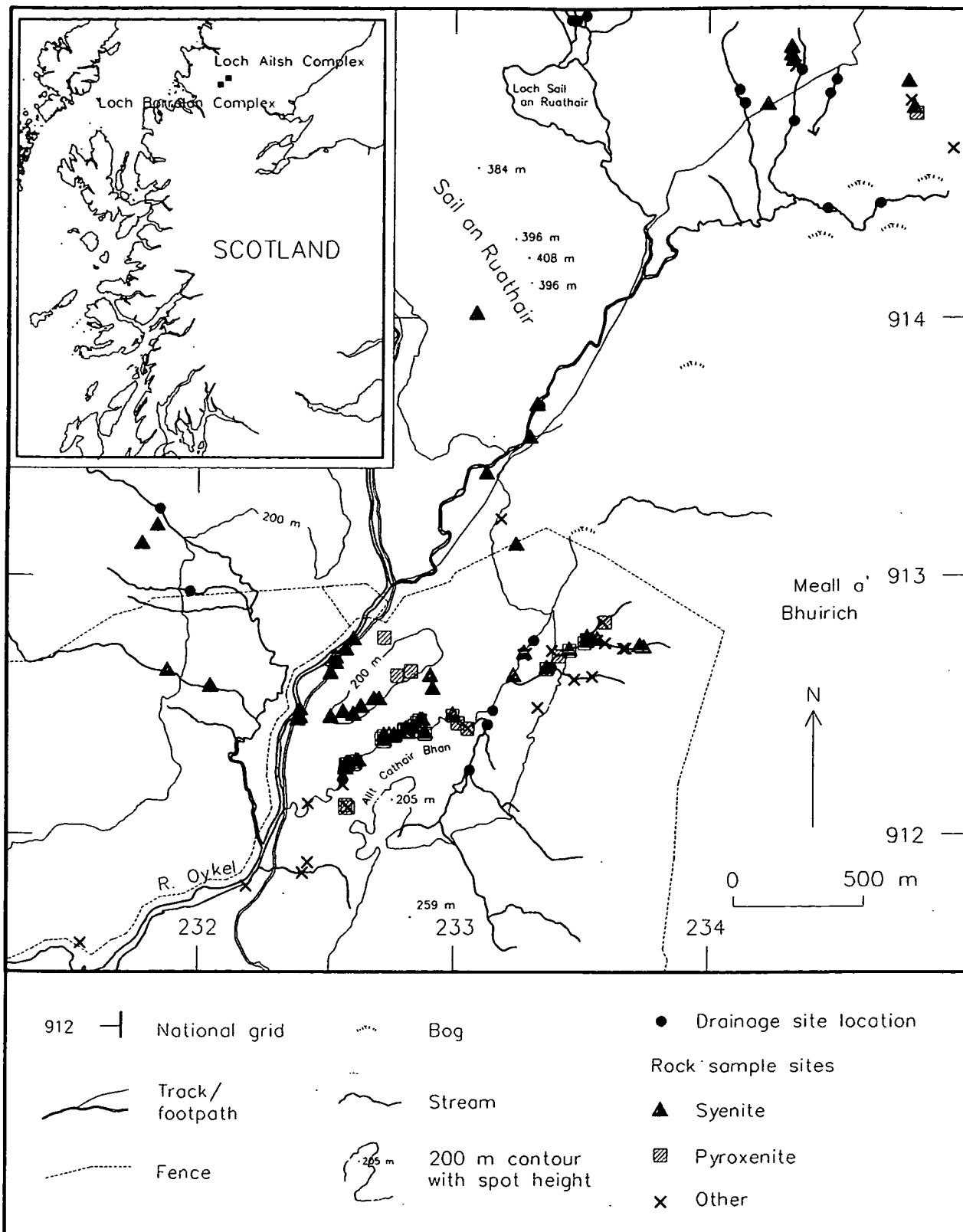


Figure 2 Locations of rock and drainage sample sites in the Loch Ailsh project area



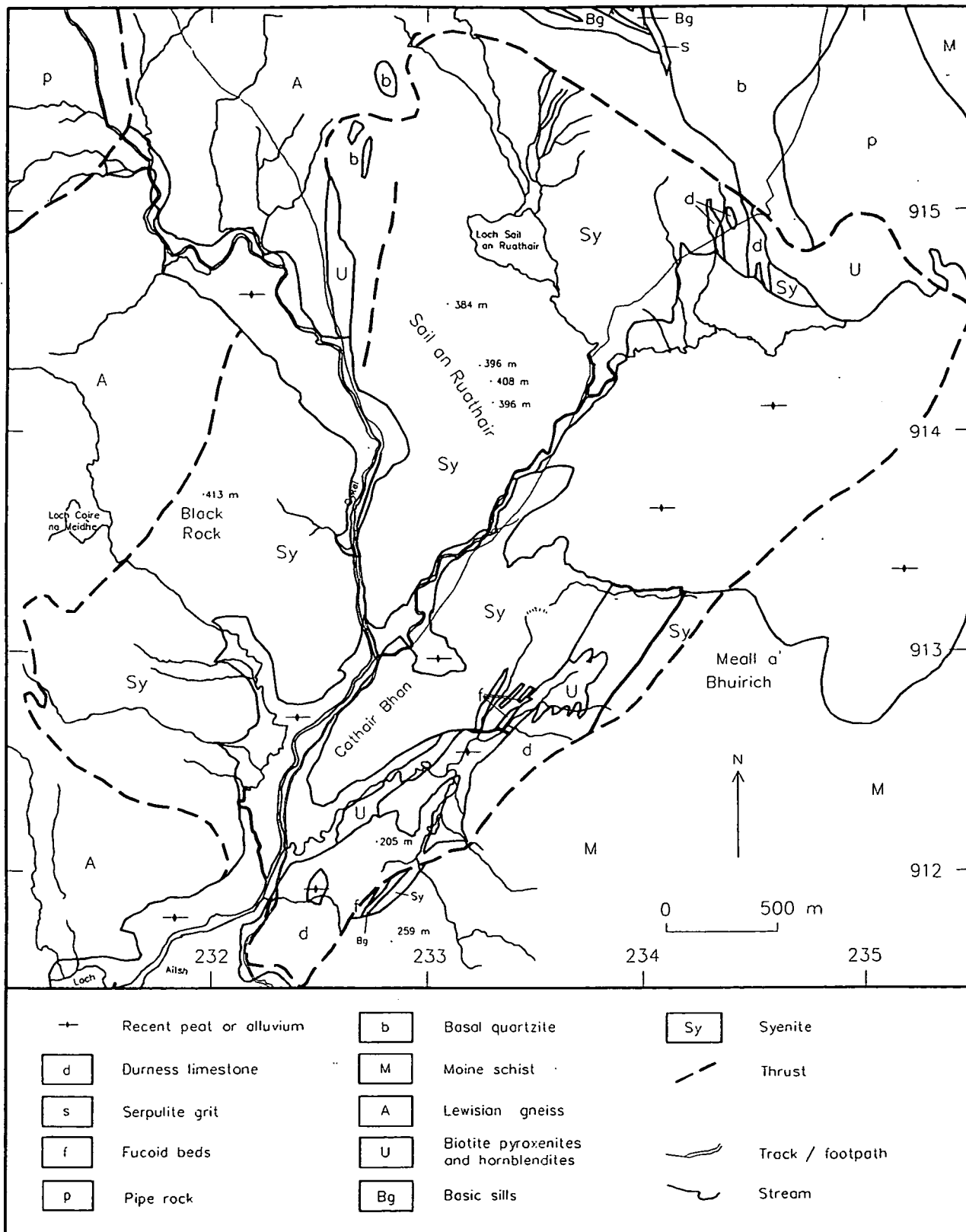
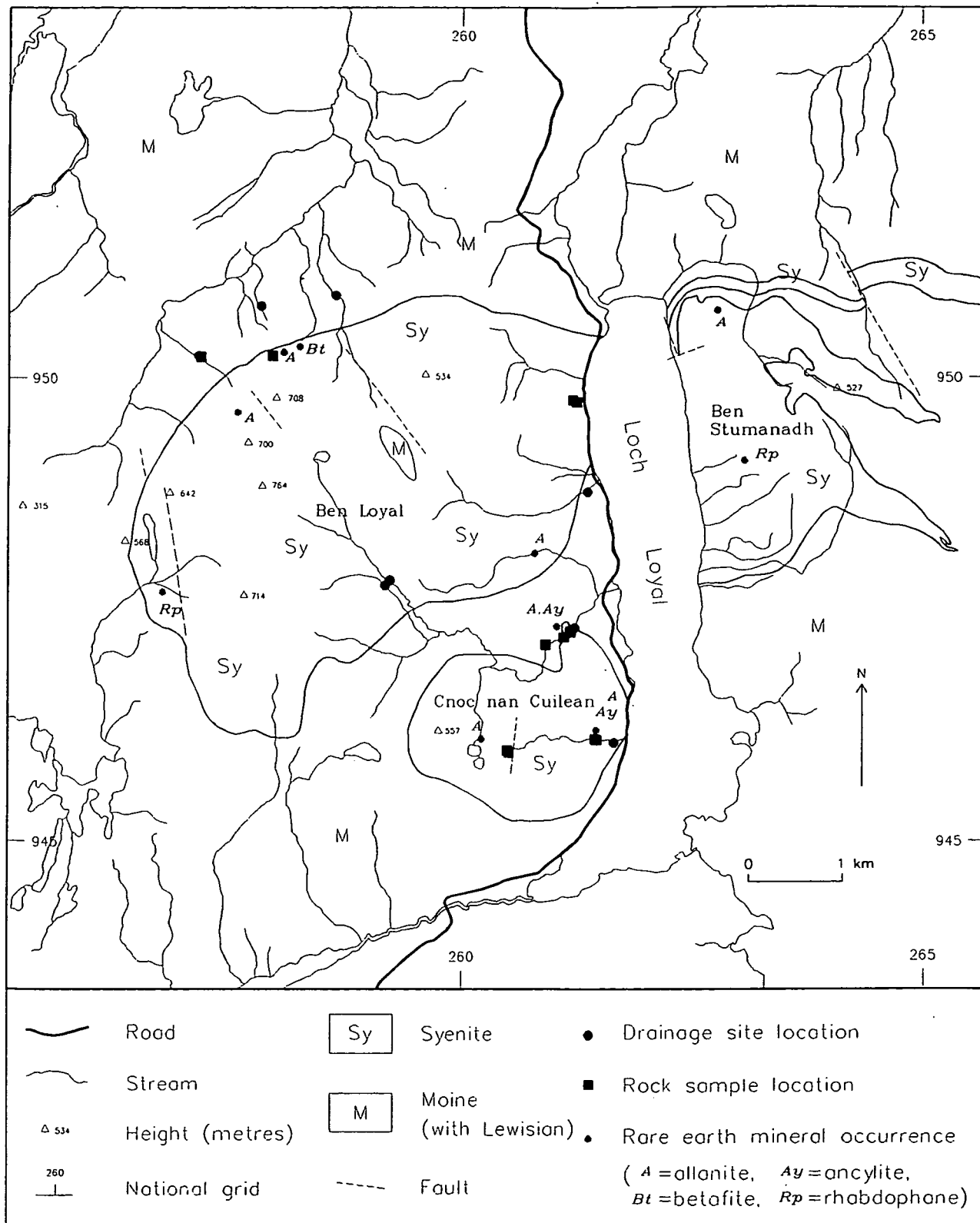


Figure 3 Geology map of the Loch Ailsh Complex



**Figure 4** Geology and sample site location map of the Ben Loyal Complex

Loch Borrailan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9003	LOCH BORRALAN BH.0.75	6.34	7.32	1FBC	54	146	33
PGD9309	LOCH BORRALAN BH.0.75	8.20	8.90	1CAD	143	316	48
PGD9310	LOCH BORRALAN BH.0.75	8.90	9.17	1ADC	85	192	33
PGD9004	LOCH BORRALAN BH.0.75	9.50	10.50	1FBC	89	251	39
PGD9005	LOCH BORRALAN BH.0.75	10.50	11.50	1FBC	78	222	40
PGD9311	LOCH BORRALAN BH.0.75	11.17	11.29	1ADC	80	204	31
PGD9006	LOCH BORRALAN BH.0.75	11.50	12.50	1FBC	59	182	38
PGD9007	LOCH BORRALAN BH.0.75	12.50	13.50	1FBC	53	165	32
PGD9185	LOCH BORRALAN BH.0.75	13.50	14.50	1FBC	60	169	32
PGD9001	LOCH BORRALAN BH.01.0	6.78	7.50	1FBC	42	120	22
PGD9562	LOCH BORRALAN BH.01.0	7.50	8.00	1FBC	52	107	20
PGD9563	LOCH BORRALAN BH.01.0	8.00	8.50	1FBC	51	109	23
PGD9564	LOCH BORRALAN BH.01.0	8.50	9.00	1FBC	81	189	29
PGD9565	LOCH BORRALAN BH.01.0	9.00	9.50	1FBC	116	311	38
PGD9566	LOCH BORRALAN BH.01.0	9.50	10.00	1FBC	45	92	20
PGD9182	LOCH BORRALAN BH.01.0	10.00	10.50	1FBC	35	102	21

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9183	LOCH BORRALAN BH.01.0	10.50	11.00	1FBC	46	130	24
PGD9567	LOCH BORRALAN BH.01.0	11.00	11.50	1FBC	30	54	16
PGD9568	LOCH BORRALAN BH.01.0	11.50	12.00	1FBC	42	81	18
PGD9569	LOCH BORRALAN BH.01.0	12.00	12.65	1FBC	82	194	36
PGD9307	LOCH BORRALAN BH.01.0	12.65	13.15	1CAD	106	211	30
PGD9184	LOCH BORRALAN BH.01.0	13.15	14.00	1FBC	89	264	34
PGD9570	LOCH BORRALAN BH.01.0	14.00	14.50	1FBC	104	281	35
PGD9571	LOCH BORRALAN BH.01.0	14.50	15.00	1FBC	79	194	22
PGD9572	LOCH BORRALAN BH.01.0	15.00	15.37	1FBC	92	222	29
PGD9308	LOCH BORRALAN BH.01.0	15.37	15.64	1CAD	378	561	12
PGD9002	LOCH BORRALAN BH.01.0	15.64	16.30	1FBC	59	173	28
PGD9239	LOCH BORRALAN BH.10.1021	12.00	12.50	1FBC	88	263	42
PGD9654	LOCH BORRALAN BH.10.1021	12.50	13.00	1FBC	103	291	49
PGD9088	LOCH BORRALAN BH.10.1021	13.00	13.50	1FBC	60	175	30
PGD9655	LOCH BORRALAN BH.10.1021	13.50	14.00	1FBC	91	227	33
PGD9089	LOCH BORRALAN	14.00	14.50	1FBC	68	190	33

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom rock Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.10.1021						
PGD9240	LOCH BORRALLAN BH.10.1021	15.00	15.50	1FBC	67	199	31
PGD9382	LOCH BORRALLAN BH.10.1021	15.50	16.00	1FF0	45	102	19
PGD9241	LOCH BORRALLAN BH.10.1021	16.00	16.50	1FBC	56	147	26
PGD9242	LOCH BORRALLAN BH.10.1021	16.50	17.00	1FBC	69	190	33
PGD9656	LOCH BORRALLAN BH.10.1021	17.00	17.50	1FBC	91	240	37
PGD9657	LOCH BORRALLAN BH.10.1021	17.50	18.00	1FBC	69	160	32
PGD9658	LOCH BORRALLAN BH.10.1021	18.00	18.50	1FBC	123	318	44
PGD9659	LOCH BORRALLAN BH.10.1021	18.50	19.00	1FBC	98	256	39
PGD9243	LOCH BORRALLAN BH.10.1021	19.00	19.50	1FBC	75	226	34
PGD9244	LOCH BORRALLAN BH.10.1021	19.50	20.00	1FBC	104	300	41
PGD9383	LOCH BORRALLAN BH.10.1021	20.00	20.55	2S00	51	121	20
PGD9384	LOCH BORRALLAN BH.10.1021	20.55	21.38	2S00	90	184	25
PGD9245	LOCH BORRALLAN BH.10.1021	22.00	22.50	1FBC	58	173	32
PGD9246	LOCH BORRALLAN BH.10.1021	22.50	23.00	1FBC	48	139	25
PGD9660	LOCH BORRALLAN BH.10.1021	23.50	24.00	1FBC	75	188	32

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9093	LOCH BORRALLAN BH.10.1021	24.00	25.00	1FBC	58	138	22
PGD9385	LOCH BORRALLAN BH.10.1021	25.06	25.33	1FFO	47	86	15
PGD9386	LOCH BORRALLAN BH.10.1021	25.33	25.55	1FBC	79	201	29
PGD9094	LOCH BORRALLAN BH.10.1021	25.50	26.00	1FBC	94	276	36
PGD9095	LOCH BORRALLAN BH.10.1021	26.00	26.50	1FBC	90	255	37
PGD9387	LOCH BORRALLAN BH.10.1021	26.50	27.20	1FBC	57	129	21
PGD9388	LOCH BORRALLAN BH.10.1021	27.20	27.88	1FBC	56	134	20
PGD9389	LOCH BORRALLAN BH.10.1021	27.88	28.89	1FFO	30	47	12
PGD9390	LOCH BORRALLAN BH.10.1021	28.89	29.17	1ADC	118	318	44
PGD9391	LOCH BORRALLAN BH.10.1021	29.17	29.41	1FFO	15	38	7
PGD9392	LOCH BORRALLAN BH.10.1021	29.41	29.91	1FBC	90	230	28
PGD9393	LOCH BORRALLAN BH.10.1021	29.91	30.71	1FFO	20	32	10
PGD9394	LOCH BORRALLAN BH.10.1021	30.71	31.65	1FFO	14	31	8
PGD9395	LOCH BORRALLAN BH.10.1021	31.65	31.85	2S00	41	107	16
PGD9396	LOCH BORRALLAN BH.10.1021	31.85	32.64	1FFO	10	14	2
PGD9546	LOCH BORRALLAN BH.10.600	3.69	5.28	1CAG	71	183	52

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	Ia (ppm)	Ce (ppm)	Y (ppm)
PGD9547	LOCH BORRALLAN BH.10.600	5.28	5.86	1FBC	97	247	45
PGD9548	LOCH BORRALLAN BH.10.600	5.86	6.42	1CA0	107	219	46
PGD9549	LOCH BORRALLAN BH.10.600	6.42	7.62	1CA0	110	212	42
PGD9550	LOCH BORRALLAN BH.10.600	7.62	8.12	1CAG	81	180	45
PGD9551	LOCH BORRALLAN BH.10.600	8.12	9.02	1CCJ	147	415	128
PGD9552	LOCH BORRALLAN BH.10.600	9.02	10.47	1CAG	68	169	41
PGD9553	LOCH BORRALLAN BH.10.600	10.47	11.85	1CAG	63	154	32
PGD9554	LOCH BORRALLAN BH.10.600	11.85	12.80	1CAG	90	235	48
PGD9555	LOCH BORRALLAN BH.10.600	12.80	14.08	1CAG	84	220	48
PGD9556	LOCH BORRALLAN BH.10.600	14.08	16.02	1CAG	66	156	32
PGD9557	LOCH BORRALLAN BH.10.600	16.02	16.47	1CAG	67	187	51
PGD9558	LOCH BORRALLAN BH.10.600	19.41	20.47	1FBC	83	234	36
PGD9559	LOCH BORRALLAN BH.10.600	20.47	21.47	1FBC	89	262	36
PGD9560	LOCH BORRALLAN BH.10.600	21.47	22.42	1CAD	98	311	90
PGD9561	LOCH BORRALLAN BH.10.600	22.42	23.37	1CCJ	77	196	27
PGD9377	LOCH BORRALLAN	4.05	5.02	1CA0	68	183	28

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom rock Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.10.650						
PGD9378	LOCH BORRALLAN BH.10.650	5.02	6.00	1CA0	60	158	25
PGD9060	LOCH BORRALLAN BH.10.650	6.00	6.50	1FBC	102	342	57
PGD9141	LOCH BORRALLAN BH.10.650	6.50	7.00	1FBC	101	357	70
PGD9589	LOCH BORRALLAN BH.10.650	7.00	7.50	1FBC	123	381	113
PGD9590	LOCH BORRALLAN BH.10.650	8.00	8.50	1FBC	100	297	68
PGD9061	LOCH BORRALLAN BH.10.650	8.50	9.00	1FBC	94	327	124
PGD9062	LOCH BORRALLAN BH.10.650	9.00	9.50	1FBC	121	387	67
PGD9379	LOCH BORRALLAN BH.10.650	9.33	9.50	1CCJ	68	183	20
PGD9142	LOCH BORRALLAN BH.10.650	9.50	10.00	1FBC	124	400	66
PGD9591	LOCH BORRALLAN BH.10.650	10.00	10.50	1FBC	117	353	50
PGD9592	LOCH BORRALLAN BH.10.650	10.50	11.00	1FBC	113	320	55
PGD9143	LOCH BORRALLAN BH.10.650	11.00	11.50	1FBC	122	387	65
PGD9593	LOCH BORRALLAN BH.10.650	11.50	12.00	1FBC	177	477	38
PGD9594	LOCH BORRALLAN BH.10.650	12.00	12.50	1FBC	153	426	44
PGD9595	LOCH BORRALLAN BH.10.650	12.50	13.00	1FBC	103	282	47



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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9144	LOCH BORRALLAN BH.10.650	13.00	13.50	1FBC	102	301	39
PGD9063	LOCH BORRALLAN BH.10.650	13.50	14.00	1FBC	100	297	36
PGD9064	LOCH BORRALLAN BH.10.650	14.00	14.50	1FBC	96	322	43
PGD9065	LOCH BORRALLAN BH.10.650	14.50	15.00	1FBC	90	297	51
PGD9145	LOCH BORRALLAN BH.10.650	15.00	15.50	1FBC	123	357	46
PGD9146	LOCH BORRALLAN BH.10.650	15.50	16.00	1FBC	117	365	93
PGD9147	LOCH BORRALLAN BH.10.650	16.00	16.50	1FBC	109	345	167
PGD9148	LOCH BORRALLAN BH.10.650	16.50	17.00	1FBC	81	329	194
PGD9149	LOCH BORRALLAN BH.10.650	17.00	17.50	1FBC	97	295	50
PGD9150	LOCH BORRALLAN BH.10.650	17.50	18.00	1FBC	111	359	75
PGD9066	LOCH BORRALLAN BH.10.650	18.00	18.50	1FBC	161	501	96
PGD9151	LOCH BORRALLAN BH.10.650	18.50	19.00	1FBC	124	385	61
PGD9152	LOCH BORRALLAN BH.10.650	19.00	19.50	1FBC	99	340	68
PGD9153	LOCH BORRALLAN BH.10.650	19.50	20.00	1FBC	91	311	48
PGD9067	LOCH BORRALLAN BH.10.650	20.00	20.50	1FBC	82	285	54
PGD9068	LOCH BORRALLAN BH.10.650	20.50	21.00	1FBC	87	307	77

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9154	LOCH BORRALLAN BH.10.650	21.00	21.50	1FBC	104	327	41
PGD9155	LOCH BORRALLAN BH.10.650	21.50	22.00	1FBC	106	342	41
PGD9156	LOCH BORRALLAN BH.10.650	22.00	22.50	1FBC	118	350	45
PGD9596	LOCH BORRALLAN BH.10.650	22.50	23.00	1FBC	113	382	70
PGD9597	LOCH BORRALLAN BH.10.650	23.00	23.50	1FBC	108	344	55
PGD9598	LOCH BORRALLAN BH.10.650	23.50	24.00	1FBC	119	317	27
PGD9069	LOCH BORRALLAN BH.10.650	24.00	24.50	1FBC	86	297	35
PGD9157	LOCH BORRALLAN BH.10.650	24.50	25.00	1FBC	89	305	52
PGD9158	LOCH BORRALLAN BH.10.650	25.00	25.50	1FBC	108	370	49
PGD9599	LOCH BORRALLAN BH.10.650	25.50	26.00	1FBC	126	382	41
PGD9600	LOCH BORRALLAN BH.10.650	26.00	26.50	1FBC	185	471	25
PGD9601	LOCH BORRALLAN BH.10.650	26.50	27.00	1FBC	102	290	47
PGD9602	LOCH BORRALLAN BH.10.650	27.00	27.50	1FBC	98	296	42
PGD9159	LOCH BORRALLAN BH.10.650	27.50	28.00	1FBC	104	350	55
PGD9160	LOCH BORRALLAN BH.10.650	28.00	28.50	1FBC	117	387	55
PGD9070	LOCH BORRALLAN	28.50	29.00	1FBC	117	372	53

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.10.650						
PGD9603	LOCH BORRALLAN BH.10.725	6.00	6.50	1FBC	94	285	42
PGD9209	LOCH BORRALLAN BH.10.725	6.50	7.00	1FBC	70	209	33
PGD9604	LOCH BORRALLAN BH.10.725	7.00	7.50	1FBC	50	123	27
PGD9605	LOCH BORRALLAN BH.10.725	7.50	8.00	1FBC	43	106	26
PGD9071	LOCH BORRALLAN BH.10.725	8.00	8.50	1FBC	78	253	34
PGD9606	LOCH BORRALLAN BH.10.725	8.50	9.00	1FBC	74	188	33
PGD9607	LOCH BORRALLAN BH.10.725	9.00	9.50	1FBC	140	427	83
PGD9210	LOCH BORRALLAN BH.10.725	9.50	10.00	1FBC	197	687	95
PGD9072	LOCH BORRALLAN BH.10.725	10.00	10.50	1FBC	107	324	39
PGD9608	LOCH BORRALLAN BH.10.725	10.50	11.00	1FBC	106	285	39
PGD9609	LOCH BORRALLAN BH.10.725	11.00	11.50	1FBC	93	252	37
PGD9610	LOCH BORRALLAN BH.10.725	11.50	12.00	1FBC	70	192	30
PGD9211	LOCH BORRALLAN BH.10.725	12.00	12.50	1FBC	84	270	31
PGD9380	LOCH BORRALLAN BH.10.725	12.47	13.10	1CCJ	67	255	33
PGD9212	LOCH BORRALLAN BH.10.725	13.10	13.50	1FBC	79	251	30

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Major rock Bottom Depth type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9213	LOCH BORRALLAN BH.10.725	13.50	14.00 1FBC	80	224	31
PGD9611	LOCH BORRALLAN BH.10.725	14.00	14.50 1FBC	73	207	32
PGD9612	LOCH BORRALLAN BH.10.725	14.50	15.00 1FBC	102	276	41
PGD9214	LOCH BORRALLAN BH.10.725	15.00	15.50 1FBC	100	290	41
PGD9613	LOCH BORRALLAN BH.10.725	15.50	16.00 1FBC	110	311	43
PGD9215	LOCH BORRALLAN BH.10.725	16.00	16.50 1FBC	106	348	48
PGD9614	LOCH BORRALLAN BH.10.725	16.50	17.00 1FBC	95	277	40
PGD9615	LOCH BORRALLAN BH.10.725	17.00	17.50 1FBC	111	322	44
PGD9073	LOCH BORRALLAN BH.10.725	18.00	18.50 1FBC	103	334	43
PGD9616	LOCH BORRALLAN BH.10.725	18.50	19.00 1FBC	90	265	38
PGD9617	LOCH BORRALLAN BH.10.725	19.00	19.50 1FBC	90	249	39
PGD9074	LOCH BORRALLAN BH.10.725	19.50	21.00 1FBC	85	276	38
PGD9381	LOCH BORRALLAN BH.10.725	21.00	21.57 1FBC	66	160	23
PGD9075	LOCH BORRALLAN BH.10.800	4.90	7.00 1FBC	62	181	31
PGD9216	LOCH BORRALLAN BH.10.800	7.00	7.50 1FBC	82	252	36
PGD9217	LOCH BORRALLAN BH.10.800	7.50	8.00 1FBC	75	227	34

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9618	LOCH BORRALLAN BH.10.800	8.00	8.50	1FBC	76	207	35
PGD9619	LOCH BORRALLAN BH.10.800	8.50	9.00	1FBC	80	210	35
PGD9620	LOCH BORRALLAN BH.10.800	9.00	9.50	1FBC	66	188	31
PGD9621	LOCH BORRALLAN BH.10.800	9.50	10.00	1FBC	103	275	40
PGD9218	LOCH BORRALLAN BH.10.800	10.00	10.50	1FBC	89	268	37
PGD9219	LOCH BORRALLAN BH.10.800	10.50	11.00	1FBC	74	236	35
PGD9220	LOCH BORRALLAN BH.10.800	11.00	11.50	1FBC	108	327	42
PGD9622	LOCH BORRALLAN BH.10.800	11.50	12.00	1FBC	104	295	40
PGD9623	LOCH BORRALLAN BH.10.800	12.00	12.50	1CAG	111	327	43
PGD9221	LOCH BORRALLAN BH.10.800	12.50	13.00	1FBC	92	289	37
PGD9624	LOCH BORRALLAN BH.10.800	13.00	13.50	1CAG	84	244	32
PGD9625	LOCH BORRALLAN BH.10.800	13.50	14.00	1CAG	78	220	32
PGD9076	LOCH BORRALLAN BH.10.800	14.00	14.50	1FBC	86	242	39
PGD9222	LOCH BORRALLAN BH.10.800	14.50	15.00	1FBC	81	265	40
PGD9223	LOCH BORRALLAN BH.10.800	15.00	15.50	1FBC	87	254	39
PGD9626	LOCH BORRALLAN	15.50	16.00	1FBC	116	359	50

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.10.800						
PGD9627	LOCH BORRALLAN BH.10.800	16.00	16.50	1FBC	95	290	42
PGD9628	LOCH BORRALLAN BH.10.800	16.50	17.00	1FBC	107	306	41
PGD9629	LOCH BORRALLAN BH.10.800	17.00	17.50	1FBC	117	356	45
PGD9224	LOCH BORRALLAN BH.10.800	17.50	18.00	1FBC	97	329	39
PGD9225	LOCH BORRALLAN BH.10.800	18.00	18.50	1FBC	102	343	45
PGD9630	LOCH BORRALLAN BH.10.800	18.50	18.80	1FBC	92	264	35
PGD9631	LOCH BORRALLAN BH.10.800	20.50	21.00	1FBC	95	277	43
PGD9632	LOCH BORRALLAN BH.10.800	21.00	21.57	1FBC	86	258	41
PGD9077	LOCH BORRALLAN BH.10.800	21.90	22.40	1FBC	94	282	47
PGD9633	LOCH BORRALLAN BH.10.800	22.40	22.82	1FBC	93	261	41
PGD9634	LOCH BORRALLAN BH.10.875	6.27	7.00	1FBC	82	236	38
PGD9635	LOCH BORRALLAN BH.10.875	7.00	7.50	1FBC	88	258	39
PGD9078	LOCH BORRALLAN BH.10.875	7.50	8.00	1FBC	73	224	32
PGD9636	LOCH BORRALLAN BH.10.875	8.00	8.50	1FBC	86	234	37
PGD9079	LOCH BORRALLAN BH.10.875	8.50	9.00	1FBC	48	119	11

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Major rock Bottom Depth type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9226	LOCH BORRALLAN BH.10.875	9.00	9.50 1FBC	65	194	24
PGD9227	LOCH BORRALLAN BH.10.875	9.50	10.00 1FBC	78	245	34
PGD9637	LOCH BORRALLAN BH.10.875	10.00	10.50 1FBC	111	329	30
PGD9228	LOCH BORRALLAN BH.10.875	10.50	11.00 1FBC	35	89	12
PGD9638	LOCH BORRALLAN BH.10.875	11.00	11.50 1FBC	97	264	24
PGD9639	LOCH BORRALLAN BH.10.875	11.50	12.00 1FBC	86	208	19
PGD9080	LOCH BORRALLAN BH.10.875	12.00	12.50 1FBC	41	106	16
PGD9229	LOCH BORRALLAN BH.10.875	12.50	13.00 1FBC	64	185	31
PGD9640	LOCH BORRALLAN BH.10.875	13.00	13.50 1FBC	84	238	37
PGD9641	LOCH BORRALLAN BH.10.875	13.50	14.00 1FBC	80	207	36
PGD9642	LOCH BORRALLAN BH.10.875	14.00	14.50 1FBC	82	243	36
PGD9230	LOCH BORRALLAN BH.10.875	14.50	15.00 1FBC	106	314	36
PGD9081	LOCH BORRALLAN BH.10.875	15.00	15.50 1FBC	83	268	43
PGD9643	LOCH BORRALLAN BH.10.875	15.50	16.00 1FBC	90	246	39
PGD9644	LOCH BORRALLAN BH.10.875	16.00	16.50 1FBC	80	235	36
PGD9645	LOCH BORRALLAN BH.10.875	16.50	17.00 1FBC	85	224	37

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9231	LOCH BORRALLAN BH.10.875	17.00	17.50	1FBC	87	282	40
PGD9082	LOCH BORRALLAN BH.10.875	17.50	18.07	1FBC	86	271	41
PGD9232	LOCH BORRALLAN BH.10.950	6.40	7.00	1FBC	87	263	37
PGD9233	LOCH BORRALLAN BH.10.950	7.00	7.50	1FBC	77	250	37
PGD9646	LOCH BORRALLAN BH.10.950	7.50	8.00	1FBC	82	210	34
PGD9647	LOCH BORRALLAN BH.10.950	8.00	8.50	1FBC	90	253	36
PGD9648	LOCH BORRALLAN BH.10.950	8.50	9.00	1FBC	89	254	37
PGD9234	LOCH BORRALLAN BH.10.950	9.00	9.50	1FBC	94	294	40
PGD9235	LOCH BORRALLAN BH.10.950	9.50	10.00	1FBC	83	243	38
PGD9649	LOCH BORRALLAN BH.10.950	10.00	10.50	1FBC	94	257	38
PGD9650	LOCH BORRALLAN BH.10.950	10.50	11.00	1FBC	114	308	39
PGD9651	LOCH BORRALLAN BH.10.950	11.00	11.50	1FBC	84	212	33
PGD9652	LOCH BORRALLAN BH.10.950	11.50	12.00	1FBC	104	294	42
PGD9653	LOCH BORRALLAN BH.10.950	12.00	12.50	1FBC	100	278	40
PGD9236	LOCH BORRALLAN BH.10.950	12.50	13.00	1FBC	109	337	40
PGD9237	LOCH BORRALLAN	13.00	13.50	1FBC	84	276	35



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Loch Borraian Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.10.950						
PGD9238	LOCH BORRALAN BH.10.950	13.50	14.00	1ADC	57	169	32
PGD9083	LOCH BORRALAN BH.10.950	14.00	14.50	1ADC	70	207	38
PGD9084	LOCH BORRALAN BH.10.950	14.50	15.00	1FF0	19	61	10
PGD9087	LOCH BORRALAN BH.10.950	16.00	16.52	1FBC	64	189	31
PGD9408	LOCH BORRALAN BH.12.1000	7.06	7.32	1FBC	80	242	35
PGD9409	LOCH BORRALAN BH.12.1000	7.32	8.00	1FBC	24	49	12
PGD9410	LOCH BORRALAN BH.12.1000	8.00	8.20	1ADC	107	267	36
PGD9411	LOCH BORRALAN BH.12.1000	8.20	8.77	1FF0	46	117	21
PGD9412	LOCH BORRALAN BH.12.1000	8.77	9.77	1FF0	26	50	13
PGD9413	LOCH BORRALAN BH.12.1000	9.77	10.07	1FBC	111	301	44
PGD9108	LOCH BORRALAN BH.12.1000	10.00	10.50	1FBC	87	291	60
PGD9414	LOCH BORRALAN BH.12.1000	10.50	10.80	1FBC	89	248	39
PGD9415	LOCH BORRALAN BH.12.1000	10.80	11.49	1FF0	42	109	21
PGD9416	LOCH BORRALAN BH.12.1000	11.49	12.10	1CAG	118	241	26
PGD9417	LOCH BORRALAN BH.12.1000	12.10	12.45	1CAG	31	87	17

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9418	LOCH BORRALAN BH.12.1000	12.45	12.85	1ADC	88	239	39
PGD9419	LOCH BORRALAN BH.12.1000	12.85	13.00	1CAG	112	244	31
PGD9420	LOCH BORRALAN BH.12.1000	13.00	14.07	1CAG	57	135	21
PGD9421	LOCH BORRALAN BH.12.1000	14.07	14.50	1FFO	56	131	24
PGD9107	LOCH BORRALAN BH.12.1000	14.50	15.00	1CAG	106	344	53
PGD9422	LOCH BORRALAN BH.12.1000	15.13	15.45	1CAG	73	205	26
PGD9423	LOCH BORRALAN BH.12.1000	15.45	16.26	1FFO	26	46	11
PGD9424	LOCH BORRALAN BH.12.1000	16.26	16.96	2S00	25	59	8
PGD9397	LOCH BORRALAN BH.12.650	10.74	10.99	1CAD	62	123	3
PGD9398	LOCH BORRALAN BH.12.650	14.80	16.00	1CAG	91	215	35
PGD9399	LOCH BORRALAN BH.12.650	16.00	17.00	1CAG	85	199	35
PGD9400	LOCH BORRALAN BH.12.650	17.00	18.25	1CAG	81	185	29
PGD9401	LOCH BORRALAN BH.12.650	18.25	19.50	1CCJ	101	463	561
PGD9402	LOCH BORRALAN BH.12.650	19.50	20.00	1CCJ	91	395	579
PGD9403	LOCH BORRALAN BH.12.650	20.00	21.02	1CCJ	106	426	604
PGD9404	LOCH BORRALAN BH.12.650	21.02	22.38	1CCJ	109	427	560

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9405	LOCH BORRALAN BH.12.650	22.38	23.84	1CCJ	66	251	297
PGD9247	LOCH BORRALAN BH.12.650	23.84	24.50	1FBC	119	306	37
PGD9661	LOCH BORRALAN BH.12.650	24.50	25.00	1FBC	94	253	45
PGD9248	LOCH BORRALAN BH.12.650	25.00	25.50	1FBC	111	314	48
PGD9662	LOCH BORRALAN BH.12.650	25.50	26.00	1FBC	77	184	31
PGD9249	LOCH BORRALAN BH.12.650	26.00	26.50	1FBC	106	320	49
PGD9663	LOCH BORRALAN BH.12.650	26.50	27.00	1FBC	95	287	55
PGD9250	LOCH BORRALAN BH.12.650	27.00	27.50	1FBC	126	359	63
PGD9096	LOCH BORRALAN BH.12.650	27.50	28.02	1FBC	76	244	40
PGD9406	LOCH BORRALAN BH.12.650	27.74	27.82	1CAD	49	110	11
PGD9664	LOCH BORRALAN BH.12.700	7.50	8.12	1FBC	99	308	62
PGD9251	LOCH BORRALAN BH.12.700	9.00	9.35	1FBC	101	369	67
PGD9252	LOCH BORRALAN BH.12.700	9.50	10.35	1FBC	105	384	65
PGD9253	LOCH BORRALAN BH.12.700	11.10	12.00	1FBC	128	472	84
PGD9665	LOCH BORRALAN BH.12.700	12.00	12.50	1FBC	192	734	134
PGD9666	LOCH BORRALAN	12.50	13.00	1FBC	100	335	62

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.12.700						
PGD9667	LOCH BORRALAN BH.12.700	13.00	13.47	1FBC	93	304	57
PGD9254	LOCH BORRALAN BH.12.700	14.28	15.00	1FBC	105	371	65
PGD9255	LOCH BORRALAN BH.12.700	15.00	15.50	1FBC	104	365	69
PGD9668	LOCH BORRALAN BH.12.700	15.50	16.00	1FBC	102	307	61
PGD9669	LOCH BORRALAN BH.12.700	16.00	16.50	1FBC	110	353	69
PGD9670	LOCH BORRALAN BH.12.700	16.50	17.00	1FBC	113	342	67
PGD9671	LOCH BORRALAN BH.12.700	17.00	17.50	1FBC	108	355	69
PGD9256	LOCH BORRALAN BH.12.700	17.50	18.00	1FBC	98	349	61
PGD9257	LOCH BORRALAN BH.12.700	18.13	19.00	1FBC	117	425	82
PGD9258	LOCH BORRALAN BH.12.700	19.00	19.50	1FBC	110	378	70
PGD9672	LOCH BORRALAN BH.12.700	19.50	20.00	1FBC	119	380	75
PGD9673	LOCH BORRALAN BH.12.700	20.00	20.50	1FBC	103	329	68
PGD9674	LOCH BORRALAN BH.12.700	20.50	21.00	1FBC	104	330	64
PGD9675	LOCH BORRALAN BH.12.700	21.00	21.50	1FBC	98	294	62
PGD9676	LOCH BORRALAN BH.12.700	21.50	22.00	1FBC	100	323	64

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9259	LOCH BORRALLAN BH.12.700	22.00	22.50	1FBC	95	349	69
PGD9260	LOCH BORRALLAN BH.12.700	22.50	23.00	1FBC	95	346	68
PGD9677	LOCH BORRALLAN BH.12.700	23.00	23.50	1FBC	109	335	70
PGD9097	LOCH BORRALLAN BH.12.700	23.50	24.24	1FBC	141	479	91
PGD9261	LOCH BORRALLAN BH.12.800	4.50	5.00	1FBC	85	279	45
PGD9678	LOCH BORRALLAN BH.12.800	5.00	5.50	1FBC	78	220	41
PGD9679	LOCH BORRALLAN BH.12.800	5.50	6.00	1FBC	83	246	44
PGD9262	LOCH BORRALLAN BH.12.800	6.00	6.50	1FBC	82	255	44
PGD9680	LOCH BORRALLAN BH.12.800	6.50	7.00	1FBC	84	236	40
PGD9681	LOCH BORRALLAN BH.12.800	7.00	7.50	1FBC	81	228	38
PGD9263	LOCH BORRALLAN BH.12.800	7.50	8.00	1FBC	35	117	28
PGD9682	LOCH BORRALLAN BH.12.800	8.00	8.50	1FBC	53	141	31
PGD9683	LOCH BORRALLAN BH.12.800	8.50	9.00	1FBC	92	289	43
PGD9264	LOCH BORRALLAN BH.12.800	9.00	9.50	1FBC	83	265	42
PGD9684	LOCH BORRALLAN BH.12.800	9.50	10.00	1FBC	106	314	47
PGD9685	LOCH BORRALLAN BH.12.800	10.00	10.50	1FBC	96	258	43

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Major rock Bottom Depth type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9265	LOCH BORRALLAN BH.12.800	10.50	11.00 1FBC	59	199	36
PGD9686	LOCH BORRALLAN BH.12.800	11.00	11.50 1FBC	139	409	66
PGD9099	LOCH BORRALLAN BH.12.800	11.50	12.00 1ADC	69	231	34
PGD9266	LOCH BORRALLAN BH.12.800	12.00	12.50 1FBC	81	253	43
PGD9687	LOCH BORRALLAN BH.12.800	12.50	13.00 1FBC	112	329	49
PGD9688	LOCH BORRALLAN BH.12.800	13.00	13.50 1FBC	68	180	35
PGD9267	LOCH BORRALLAN BH.12.800	13.50	14.00 1FBC	92	270	38
PGD9268	LOCH BORRALLAN BH.12.800	14.00	14.50 1ADC	63	196	37
PGD9269	LOCH BORRALLAN BH.12.800	14.50	15.00 1FBC	74	224	35
PGD9689	LOCH BORRALLAN BH.12.800	15.00	15.50 1FBC	72	179	36
PGD9690	LOCH BORRALLAN BH.12.800	15.50	16.00 1FBC	81	218	37
PGD9101	LOCH BORRALLAN BH.12.800	16.50	17.00 1FBC	111	372	47
PGD9691	LOCH BORRALLAN BH.12.800	17.00	17.31 1FBC	91	256	43
PGD9407	LOCH BORRALLAN BH.12.800	17.31	17.51 1CAG	53	99	8
PGD9270	LOCH BORRALLAN BH.12.800	17.50	17.90 1FBC	75	242	39
PGD9271	LOCH BORRALLAN	8.50	9.00 1FBC	35	78	16

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Loch Borrailan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom rock Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.12.900						
PGD9272	LOCH BORRALAN BH.12.900	9.00	9.50	1FBC	93	309	44
PGD9692	LOCH BORRALAN BH.12.900	9.50	10.00	1FBC	176	572	71
PGD9693	LOCH BORRALAN BH.12.900	10.00	10.50	1FBC	93	289	44
PGD9273	LOCH BORRALAN BH.12.900	10.50	11.00	1FBC	82	235	37
PGD9104	LOCH BORRALAN BH.12.900	12.50	13.00	1FBC	116	393	55
PGD9274	LOCH BORRALAN BH.12.900	13.50	14.00	1FBC	98	336	48
PGD9275	LOCH BORRALAN BH.12.900	14.69	15.00	1FBC	120	356	46
PGD9276	LOCH BORRALAN BH.12.900	15.00	15.50	1FBC	102	334	41
PGD9694	LOCH BORRALAN BH.12.900	15.50	16.00	1FBC	106	299	43
PGD9695	LOCH BORRALAN BH.12.900	16.00	16.50	1FBC	108	326	44
PGD9277	LOCH BORRALAN BH.12.900	16.50	17.00	1FBC	99	305	40
PGD9696	LOCH BORRALAN BH.12.900	17.00	17.50	1FBC	79	217	36
PGD9697	LOCH BORRALAN BH.12.900	17.50	18.00	1FBC	111	322	52
PGD9106	LOCH BORRALAN BH.12.900	18.00	18.52	1FBC	71	205	30
PGD9109	LOCH BORRALAN BH.14.700	5.65	6.50	1FBC	92	310	45

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Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9278	LOCH BORRALLAN BH.14.700	6.50	7.00	1FBC	86	296	75
PGD9279	LOCH BORRALLAN BH.14.700	7.00	7.50	1FBC	104	370	99
PGD9280	LOCH BORRALLAN BH.14.700	7.50	8.00	1FBC	69	223	41
PGD9281	LOCH BORRALLAN BH.14.700	8.00	8.50	1FBC	80	243	50
PGD9110	LOCH BORRALLAN BH.14.700	8.50	9.00	1FBC	64	201	44
PGD9425	LOCH BORRALLAN BH.14.700	9.03	9.27	1FBC	69	204	28
PGD9426	LOCH BORRALLAN BH.14.700	9.27	10.22	1CAG	17	42	8
PGD9427	LOCH BORRALLAN BH.14.700	10.22	11.16	1CAG	50	106	7
PGD9111	LOCH BORRALLAN BH.14.700	11.25	12.00	1FBC	33	122	24
PGD9112	LOCH BORRALLAN BH.14.700	12.00	12.50	1FBC	73	223	33
PGD9113	LOCH BORRALLAN BH.14.700	12.50	13.00	1FBC	77	236	39
PGD9114	LOCH BORRALLAN BH.14.700	13.00	13.74	1FBC	68	202	30
PGD9428	LOCH BORRALLAN BH.14.700	13.74	14.22	1CAD	59	136	16
PGD9429	LOCH BORRALLAN BH.14.700	14.22	15.07	1CAD	43	117	20
PGD9430	LOCH BORRALLAN BH.14.700	15.07	15.44	1CAD	72	142	11
PGD9431	LOCH BORRALLAN BH.14.700	15.44	16.02	1CAD	47	140	21



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Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9432	LOCH BORRALLAN BH.14.700	16.02	16.17	1CAD	71	125	10
PGD9433	LOCH BORRALLAN BH.14.700	16.17	16.72	1FBC	56	119	27
PGD9434	LOCH BORRALLAN BH.14.700	16.72	17.13	1CCJ	45	94	10
PGD9435	LOCH BORRALLAN BH.14.700	17.13	18.13	1CCJ	49	158	30
PGD9436	LOCH BORRALLAN BH.14.700	18.22	19.02	1CCJ	45	132	24
PGD9437	LOCH BORRALLAN BH.14.700	19.02	19.67	1CCJ	32	105	21
PGD9438	LOCH BORRALLAN BH.14.800	4.50	5.00	1CAG	40	107	11
PGD9439	LOCH BORRALLAN BH.14.800	5.00	5.72	1CAG	37	94	12
PGD9440	LOCH BORRALLAN BH.14.800	5.72	6.50	1CAG	47	141	15
PGD9441	LOCH BORRALLAN BH.14.800	6.50	7.14	1CAG	112	380	67
PGD9442	LOCH BORRALLAN BH.14.800	7.14	7.66	1CAG	58	170	19
PGD9443	LOCH BORRALLAN BH.14.800	7.66	8.80	1CAG	57	153	31
PGD9282	LOCH BORRALLAN BH.14.800	8.80	9.50	1FBC	65	183	34
PGD9283	LOCH BORRALLAN BH.14.800	9.50	10.00	1FBC	55	164	33
PGD9115	LOCH BORRALLAN BH.14.800	10.00	10.50	1FBC	63	172	29
PGD9116	LOCH BORRALLAN	10.50	11.00	1FBC	74	241	32

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.14.800						
PGD9284	LOCH BORRALLAN BH.14.800	11.00	11.50	1FBC	61	148	25
PGD9285	LOCH BORRALLAN BH.14.800	11.50	12.00	1FBC	68	204	32
PGD9286	LOCH BORRALLAN BH.14.800	12.00	12.50	1FBC	61	186	33
PGD9287	LOCH BORRALLAN BH.14.800	12.50	13.00	1FBC	63	189	35
PGD9288	LOCH BORRALLAN BH.14.800	13.00	13.50	1FBC	55	173	35
PGD9289	LOCH BORRALLAN BH.14.800	14.00	14.50	1FBC	63	185	30
PGD9290	LOCH BORRALLAN BH.14.800	14.50	15.00	1FBC	53	187	29
PGD9291	LOCH BORRALLAN BH.14.800	15.00	15.50	1FBC	61	193	32
PGD9292	LOCH BORRALLAN BH.14.800	15.50	16.00	1FBC	57	177	33
PGD9293	LOCH BORRALLAN BH.14.800	16.00	16.50	1FBC	59	206	35
PGD9117	LOCH BORRALLAN BH.14.800	16.50	17.34	1FBC	56	155	26
PGD9445	LOCH BORRALLAN BH.14.850	7.30	7.82	1CAG	39	104	8
PGD9294	LOCH BORRALLAN BH.14.850	7.82	9.00	1FBC	32	93	19
PGD9295	LOCH BORRALLAN BH.14.850	9.00	9.50	1FBC	43	97	17
PGD9296	LOCH BORRALLAN BH.14.850	9.50	10.00	1FBC	49	138	17

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9297	LOCH BORRALLAN BH.14.850	10.00	10.50	1FBC	102	320	51
PGD9298	LOCH BORRALLAN BH.14.850	10.50	11.00	1FBC	67	170	25
PGD9299	LOCH BORRALLAN BH.14.850	11.00	11.50	1FBC	84	231	44
PGD9300	LOCH BORRALLAN BH.14.850	11.50	12.00	1FBC	77	179	18
PGD9301	LOCH BORRALLAN BH.14.850	12.00	12.50	1FBC	61	144	16
PGD9302	LOCH BORRALLAN BH.14.850	12.50	13.00	1FBC	84	204	24
PGD9303	LOCH BORRALLAN BH.14.850	13.00	13.50	1FBC	67	165	28
PGD9304	LOCH BORRALLAN BH.14.850	13.50	14.00	1FBC	59	153	27
PGD9444	LOCH BORRALLAN BH.14.850	13.70	14.22	1FBC	57	135	20
PGD9118	LOCH BORRALLAN BH.14.850	14.00	14.50	1FBC	59	147	27
PGD9305	LOCH BORRALLAN BH.14.850	14.50	15.00	1FBC	69	191	35
PGD9119	LOCH BORRALLAN BH.14.850	15.00	15.50	1FBC	68	208	38
PGD9306	LOCH BORRALLAN BH.14.850	15.50	16.00	1FBC	69	205	31
PGD9446	LOCH BORRALLAN BH.14.850	16.20	16.67	1FBC	85	224	31
PGD9447	LOCH BORRALLAN BH.14.850	16.67	16.80	1CAD	111	186	3
PGD9448	LOCH BORRALLAN BH.14.850	16.80	17.39	1FBC	102	282	38

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Loch Borrailan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9449	LOCH BORRALAN BH.14.850	17.39	18.00	1FBC	95	242	32
PGD9450	LOCH BORRALAN BH.14.850	18.00	18.81	1FBC	91	227	33
PGD9451	LOCH BORRALAN BH.14.850	18.81	19.44	1FBC	95	252	37
PGD9452	LOCH BORRALAN BH.14.850	19.44	19.98	1FBC	64	157	25
PGD9453	LOCH BORRALAN BH.14.850	19.98	20.19	2S00	48	111	22
PGD9454	LOCH BORRALAN BH.14.850	20.19	20.83	1FBC	93	236	34
PGD9120	LOCH BORRALAN BH.14.850	20.78	21.78	1FBC	81	235	36
PGD9455	LOCH BORRALAN BH.14.900	6.90	8.12	1FBC	96	280	39
PGD9456	LOCH BORRALAN BH.14.900	8.12	8.85	1FBC	92	247	34
PGD9457	LOCH BORRALAN BH.14.900	8.85	9.52	1CAG	98	262	35
PGD9458	LOCH BORRALAN BH.14.900	9.52	10.12	1CAG	79	208	31
PGD9459	LOCH BORRALAN BH.14.900	10.12	11.02	1FBC	34	62	11
PGD9460	LOCH BORRALAN BH.14.900	11.02	12.00	1CAG	96	261	35
PGD9121	LOCH BORRALAN BH.14.900	12.00	13.00	1CAG	105	295	41
PGD9461	LOCH BORRALAN BH.14.900	13.00	13.90	1FBC	87	224	32
PGD9462	LOCH BORRALAN	13.90	14.54	1FBC	86	217	27

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Major rock Bottom Depth type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.14.900					
PGD9122	LOCH BORRALLAN BH.14.900	14.50	15.00 1FBC	94	287	46
PGD9123	LOCH BORRALLAN BH.14.900	15.00	15.50 1FBC	84	274	47
PGD9463	LOCH BORRALLAN BH.14.900	15.52	15.76 1FBC	89	247	33
PGD9464	LOCH BORRALLAN BH.14.900	15.76	16.00 1FBC	79	210	19
PGD9465	LOCH BORRALLAN BH.14.900	16.00	16.80 1FBC	84	240	31
PGD9466	LOCH BORRALLAN BH.14.900	16.80	17.38 1FBC	36	76	5
PGD9467	LOCH BORRALLAN BH.16.660	6.10	7.45 1CAG	98	227	42
PGD9468	LOCH BORRALLAN BH.16.660	7.45	8.70 1CAG	106	240	43
PGD9469	LOCH BORRALLAN BH.16.660	8.70	11.20 1CAG	101	234	43
PGD9470	LOCH BORRALLAN BH.16.660	11.20	12.22 1CAG	102	226	42
PGD9471	LOCH BORRALLAN BH.16.660	12.22	13.10 1CAG	109	254	44
PGD9472	LOCH BORRALLAN BH.16.660	13.10	14.20 1CAG	104	223	41
PGD9473	LOCH BORRALLAN BH.16.660	14.20	15.37 1CAG	90	198	32
PGD9474	LOCH BORRALLAN BH.16.660	15.37	16.25 1CAG	103	229	41
PGD9475	LOCH BORRALLAN BH.16.660	16.25	17.72 1CAG	92	237	40

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9476	LOCH BORRALLAN BH.16.660	17.72	19.15	ICAG	97	229	40
PGD9477	LOCH BORRALLAN BH.16.660	19.15	20.57	ICAG	98	239	40
PGD9478	LOCH BORRALLAN BH.16.660	20.57	22.12	ICAG	98	228	40
PGD9479	LOCH BORRALLAN BH.16.660	22.12	23.83	ICAG	96	237	41
PGD9480	LOCH BORRALLAN BH.16.660	23.83	25.29	ICAG	97	216	40
PGD9481	LOCH BORRALLAN BH.16.660	25.29	26.59	ICAG	99	233	41
PGD9482	LOCH BORRALLAN BH.16.660	26.59	27.70	ICAG	85	197	38
PGD9483	LOCH BORRALLAN BH.16.660	27.70	28.72	ICAG	101	232	42
PGD9161	LOCH BORRALLAN BH.16.750	8.50	9.00	1FBC	57	159	33
PGD9162	LOCH BORRALLAN BH.16.750	9.00	9.50	1FBC	65	181	50
PGD9163	LOCH BORRALLAN BH.16.750	9.50	10.00	1FBC	79	236	62
PGD9164	LOCH BORRALLAN BH.16.750	10.00	10.50	1FBC	119	334	33
PGD9165	LOCH BORRALLAN BH.16.750	10.50	11.00	1FBC	120	362	57
PGD9125	LOCH BORRALLAN BH.16.750	11.00	11.50	1FBC	106	312	80
PGD9126	LOCH BORRALLAN BH.16.750	11.50	12.00	1FBC	94	278	55
PGD9127	LOCH BORRALLAN BH.16.750	12.00	12.50	1FBC	64	183	29

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9166	LOCH BORRALLAN BH.16.750	12.50	13.00	1FBC	53	154	24
PGD9167	LOCH BORRALLAN BH.16.750	13.00	13.50	1FBC	110	346	49
PGD9168	LOCH BORRALLAN BH.16.750	13.50	14.00	1FBC	60	157	28
PGD9169	LOCH BORRALLAN BH.16.750	14.00	14.50	1FBC	47	156	23
PGD9170	LOCH BORRALLAN BH.16.750	14.50	15.00	1FBC	55	165	23
PGD9171	LOCH BORRALLAN BH.16.750	15.00	15.50	1FBC	64	190	29
PGD9172	LOCH BORRALLAN BH.16.750	15.50	16.00	1FBC	66	193	37
PGD9173	LOCH BORRALLAN BH.16.750	16.00	16.50	1FBC	57	165	27
PGD9174	LOCH BORRALLAN BH.16.750	16.50	17.00	1FBC	70	199	31
PGD9175	LOCH BORRALLAN BH.16.750	17.00	17.50	1FBC	79	246	36
PGD9128	LOCH BORRALLAN BH.16.750	17.50	18.00	1FBC	134	413	61
PGD9129	LOCH BORRALLAN BH.16.750	18.00	18.50	1FBC	182	489	41
PGD9130	LOCH BORRALLAN BH.16.750	18.50	19.00	1FBC	144	381	51
PGD9176	LOCH BORRALLAN BH.16.750	19.00	19.50	1FBC	95	355	298
PGD9177	LOCH BORRALLAN BH.16.750	19.50	20.00	1FBC	103	326	56
PGD9178	LOCH BORRALLAN	20.00	20.50	1FBC	94	288	60

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.16.750						
PGD9131	LOCH BORRALLAN BH.16.750	20.50	21.00	1FBC	169	548	244
PGD9132	LOCH BORRALLAN BH.16.750	21.00	21.50	1FBC	129	436	259
PGD9133	LOCH BORRALLAN BH.16.750	21.50	22.00	1FBC	154	546	268
PGD9484	LOCH BORRALLAN BH.16.750	21.53	21.83	1CAG	103	285	110
PGD9485	LOCH BORRALLAN BH.16.750	21.83	22.01	1FBC	102	285	39
PGD9486	LOCH BORRALLAN BH.16.875	9.50	10.52	1CAG	125	362	117
PGD9487	LOCH BORRALLAN BH.16.875	10.52	12.45	1CAG	133	394	129
PGD9488	LOCH BORRALLAN BH.16.875	12.45	12.55	1CCJ	63	236	107
PGD9489	LOCH BORRALLAN BH.16.875	12.55	13.18	1FBC	91	236	32
PGD9490	LOCH BORRALLAN BH.16.875	13.18	13.63	1CAG	103	256	14
PGD9179	LOCH BORRALLAN BH.16.875	13.63	14.00	1FBC	125	356	51
PGD9180	LOCH BORRALLAN BH.16.875	14.00	14.50	1FBC	114	333	36
PGD9135	LOCH BORRALLAN BH.16.875	15.00	15.50	1FBC	127	393	50
PGD9137	LOCH BORRALLAN BH.16.875	16.00	16.70	1CAG	44	139	38
PGD9491	LOCH BORRALLAN BH.16.875	17.30	17.82	1CAG	81	201	15



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Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9492	LOCH BORRALLAN BH.16.875	17.95	18.23	1FBC	72	182	24
PGD9493	LOCH BORRALLAN BH.16.875	18.23	18.57	1CCJ	64	147	18
PGD9494	LOCH BORRALLAN BH.18.720	5.20	6.62	1CAG	116	266	51
PGD9495	LOCH BORRALLAN BH.18.720	6.62	7.60	1CAG	124	285	52
PGD9496	LOCH BORRALLAN BH.18.720	7.60	8.50	1CAG	125	300	56
PGD9497	LOCH BORRALLAN BH.18.720	8.50	10.00	1CAG	123	297	51
PGD9498	LOCH BORRALLAN BH.18.720	15.25	16.75	1CAG	93	226	45
PGD9499	LOCH BORRALLAN BH.18.720	16.75	17.82	1CAG	101	222	43
PGD9500	LOCH BORRALLAN BH.18.720	17.82	19.10	1CAG	96	214	43
PGD9501	LOCH BORRALLAN BH.18.720	19.10	20.90	1CAG	96	219	45
PGD9502	LOCH BORRALLAN BH.18.720	20.90	22.43	1CAG	105	246	47
PGD9181	LOCH BORRALLAN BH.18.720	22.50	23.00	1FBC	206	689	231
PGD9138	LOCH BORRALLAN BH.18.720	23.00	23.50	1FBC	161	488	86
PGD9139	LOCH BORRALLAN BH.18.720	23.50	24.00	1FBC	170	543	121
PGD9140	LOCH BORRALLAN BH.18.720	24.00	24.52	1FBC	156	508	110
PGD9503	LOCH BORRALLAN BH.18.993	7.00	8.48	2S00	130	316	31

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Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9504	LOCH BORRALLAN BH.18.993	8.48	9.74	2500	103	211	21
PGD9505	LOCH BORRALLAN BH.18.993	9.74	10.46	1FBC	14	17	4
PGD9506	LOCH BORRALLAN BH.18.993	10.46	11.39	2500	87	227	28
PGD9507	LOCH BORRALLAN BH.18.993	11.39	12.75	1CCJ	89	269	73
PGD9508	LOCH BORRALLAN BH.18.993	12.75	14.27	1CCJ	105	310	66
PGD9509	LOCH BORRALLAN BH.18.993	14.27	15.75	1CCJ	66	157	23
PGD9510	LOCH BORRALLAN BH.18.993	15.75	15.86	2R00	62	94	9
PGD9511	LOCH BORRALLAN BH.18.993	15.86	16.32	1CCJ	47	103	12
PGD9512	LOCH BORRALLAN BH.18.993	16.32	16.69	1CCJ	91	256	50
PGD9523	LOCH BORRALLAN BH.18.993	16.69	17.38	2S00	53	149	11
PGD9514	LOCH BORRALLAN BH.18.993	17.38	18.25	1FF0	77	163	12
PGD9515	LOCH BORRALLAN BH.18.993	18.25	18.84	2R00	97	274	43
PGD9516	LOCH BORRALLAN BH.18.993	18.84	19.50	1CCJ	52	126	16
PGD9517	LOCH BORRALLAN BH.18.993	19.50	20.15	1CA0	53	118	5
PGD9518	LOCH BORRALLAN BH.18.993	20.15	21.00	1CA0	52	86	5
PGD9519	LOCH BORRALLAN	21.00	22.35	1CA0	62	141	11

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Major rock type	Bottom Depth	La (ppm)	Ce (ppm)	Y (ppm)
	BH.18.993						
PGD9520	LOCH BORRALLAN BH.18.993	22.35	1CA0	22.74	54	149	16
PGD9521	LOCH BORRALLAN BH.18.993	22.74	1CA0	23.44	56	123	15
PGD9522	LOCH BORRALLAN BH.18.993	23.44	2R00	23.84	56	129	12
PGD9523	LOCH BORRALLAN BH.18.993	23.84	1CCJ	24.92	53	149	11
PGD9008	LOCH BORRALLAN BH.2.50	8.19	1FBE	9.00	100	492	75
PGD9186	LOCH BORRALLAN BH.2.50	11.00	1FBC	11.50	76	223	18
PGD9187	LOCH BORRALLAN BH.2.50	12.50	1FBC	13.00	74	208	7
PGD9016	LOCH BORRALLAN BH.2.50	13.50	1FBC	14.00	107	306	7
PGD9312	LOCH BORRALLAN BH.2.50	14.00	1FBC	14.45	76	240	64
PGD9313	LOCH BORRALLAN BH.2.50	14.45	1FBE	15.00	98	372	44
PGD9018	LOCH BORRALLAN BH.2.50	15.50	1FBC	16.17	107	344	18
PGD9524	LOCH BORRALLAN BH.20.720	8.32	1CAG	9.37	108	269	50
PGD9525	LOCH BORRALLAN BH.20.720	9.37	1CAG	10.40	96	234	47
PGD9526	LOCH BORRALLAN BH.20.720	10.40	1CAG	11.87	99	258	46
PGD9527	LOCH BORRALLAN BH.20.720	11.87	1FBC	12.40	110	355	208

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9528	LOCH BORRALAN BH.20.720	12.40	12.60	1CAD	47	128	41
PGD9529	LOCH BORRALAN BH.20.720	12.60	13.62	1FBE	141	530	449
PGD9530	LOCH BORRALAN BH.20.720	15.00	15.25	1FBE	24	51	17
PGD9531	LOCH BORRALAN BH.20.720	18.34	18.78	1CA0	19	41	8
PGD9532	LOCH BORRALAN BH.20.720	18.78	19.75	1FBE	120	486	465
PGD9533	LOCH BORRALAN BH.20.720	19.75	20.60	1FBE	138	533	370
PGD9534	LOCH BORRALAN BH.22.720	6.80	10.27	1CAG	94	224	43
PGD9535	LOCH BORRALAN BH.22.720	10.27	11.30	1CAG	92	194	36
PGD9536	LOCH BORRALAN BH.22.720	11.30	11.72	1CAD	90	187	26
PGD9537	LOCH BORRALAN BH.22.720	11.72	12.32	1CAD	12	9	2
PGD9538	LOCH BORRALAN BH.22.720	12.32	13.65	1CAG	84	198	38
PGD9539	LOCH BORRALAN BH.22.720	19.00	20.20	1CAG	100	239	41
PGD9540	LOCH BORRALAN BH.22.720	20.20	21.32	1CAG	93	230	39
PGD9541	LOCH BORRALAN BH.22.720	21.32	22.57	1CAG	81	201	36
PGD9542	LOCH BORRALAN BH.22.720	22.57	23.97	1CAG	94	240	42
PGD9543	LOCH BORRALAN BH.22.720	23.97	24.70	1CAG	104	246	44

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9544	LOCH BORRALAN BH.22.720	24.70	25.50	1CAG	93	235	39
PGD9545	LOCH BORRALAN BH.22.720	25.50	26.36	1CAG	106	275	49
PGD9314	LOCH BORRALAN BH.4.200	6.20	7.70	1CAG	95	239	41
PGD9315	LOCH BORRALAN BH.4.200	7.70	8.70	1CAG	105	265	48
PGD9316	LOCH BORRALAN BH.4.200	8.70	9.71	1CAG	85	210	39
PGD9317	LOCH BORRALAN BH.4.200	9.71	10.11	1CAG	96	234	52
PGD9573	LOCH BORRALAN BH.4.305	5.00	5.50	1FBE	110	467	699
PGD9032	LOCH BORRALAN BH.4.305	12.00	12.72	1FBE	121	528	618
PGD9318	LOCH BORRALAN BH.4.480	4.05	4.73	1FBC	85	240	39
PGD9319	LOCH BORRALAN BH.4.480	4.73	5.50	1FBC	99	278	67
PGD9033	LOCH BORRALAN BH.4.480	5.50	6.00	1FBC	83	288	37
PGD9320	LOCH BORRALAN BH.4.480	6.00	6.45	1FBC	74	196	50
PGD9034	LOCH BORRALAN BH.4.480	6.45	7.18	1FBC	74	239	32
PGD9321	LOCH BORRALAN BH.4.480	7.18	7.90	1FBC	90	241	45
PGD9035	LOCH BORRALAN BH.4.480	7.90	8.90	1FBC	65	204	29
PGD9322	LOCH BORRALAN	8.90	9.30	1FBC	97	271	63

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9323	LOCH BORRALAN BH.4.480	9.30	10.15	ICAG	80	229	69
PGD9324	LOCH BORRALAN BH.4.480	10.15	10.55	1FBC	159	422	24
PGD9325	LOCH BORRALAN BH.4.480	10.55	11.07	1CAG	110	301	48
PGD9326	LOCH BORRALAN BH.4.480	11.07	11.77	1FBC	116	370	68
PGD9326	LOCH BORRALAN BH.4.480	11.59	11.95	1FBC	56	156	15
PGD9327	LOCH BORRALAN BH.4.480	11.95	12.78	1CAD	130	364	58
PGD9328	LOCH BORRALAN BH.4.480	12.78	13.20	1CCJ	169	453	74
PGD9329	LOCH BORRALAN BH.4.480	13.20	13.58	1CCJ	142	465	25
PGD9330	LOCH BORRALAN BH.4.680	5.67	5.97	1ADC	42	98	23
PGD9331	LOCH BORRALAN BH.4.680	5.97	7.10	1FBC	50	104	22
PGD9332	LOCH BORRALAN BH.4.680	7.10	7.92	1FFO	40	91	19
PGD9333	LOCH BORRALAN BH.4.680	7.92	8.62	1FFO	40	89	21
PGD9334	LOCH BORRALAN BH.4.680	8.62	9.06	1FFO	30	66	16
PGD9335	LOCH BORRALAN BH.4.680	9.06	9.60	1FFO	32	71	12
PGD9336	LOCH BORRALAN BH.4.680	9.60	10.05	1FFO	17	31	8

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9337	LOCH BORRALLAN BH. 4.680	10.05	11.22	1FF0	31	56	10
PGD9339	LOCH BORRALLAN BH. 6.500	4.37	5.57	1CAG	110	306	96
PGD9340	LOCH BORRALLAN BH. 6.500	5.57	6.40	1CAG	117	321	87
PGD9341	LOCH BORRALLAN BH. 6.500	6.40	7.37	1CAG	118	347	84
PGD9342	LOCH BORRALLAN BH. 6.500	7.37	8.87	1CAG	120	335	81
PGD9574	LOCH BORRALLAN BH. 6.600	6.38	7.00	1FBC	102	316	72
PGD9575	LOCH BORRALLAN BH. 6.600	7.00	7.50	1FBC	98	294	65
PGD9576	LOCH BORRALLAN BH. 6.600	7.50	8.00	1FBC	109	334	68
PGD9577	LOCH BORRALLAN BH. 6.600	8.00	8.50	1FBC	111	362	81
PGD9578	LOCH BORRALLAN BH. 6.600	9.00	9.22	1FBC	108	347	79
PGD9338	LOCH BORRALLAN BH. 6.600	9.35	9.63	1CAD	26	67	8
PGD9579	LOCH BORRALLAN BH. 6.600	10.00	10.50	1FBC	126	416	88
PGD9188	LOCH BORRALLAN BH. 6.600	10.50	11.00	1FBC	119	418	82
PGD9189	LOCH BORRALLAN BH. 6.600	11.00	11.50	1FBC	94	346	76
PGD9190	LOCH BORRALLAN BH. 6.600	11.50	12.00	1FBC	104	357	87
PGD9191	LOCH BORRALLAN BH. 6.600	12.00	12.65	1FBC	96	301	69

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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9037	LOCH BORRALLAN BH.6.690	7.45	8.00	1FBC	109	364	46
PGD9192	LOCH BORRALLAN BH.6.690	8.00	8.50	1FBC	81	250	44
PGD9038	LOCH BORRALLAN BH.6.690	8.50	9.00	1FBC	75	221	34
PGD9039	LOCH BORRALLAN BH.6.690	9.00	9.50	1FBC	50	136	22
PGD9040	LOCH BORRALLAN BH.6.690	9.50	10.00	1FBC	39	120	29
PGD9193	LOCH BORRALLAN BH.6.690	10.00	10.50	1FBC	79	241	38
PGD9194	LOCH BORRALLAN BH.6.690	10.50	11.00	1FBC	85	273	42
PGD9195	LOCH BORRALLAN BH.6.690	11.00	11.50	1FBC	88	255	43
PGD9196	LOCH BORRALLAN BH.6.690	11.50	12.00	1FBC	96	329	49
PGD9197	LOCH BORRALLAN BH.6.690	12.00	12.50	1FBC	87	284	40
PGD9198	LOCH BORRALLAN BH.6.690	12.50	13.00	1FBC	88	289	36
PGD9199	LOCH BORRALLAN BH.6.690	13.00	13.50	1FBC	85	246	37
PGD9200	LOCH BORRALLAN BH.6.690	13.50	14.00	1FBC	92	320	43
PGD9201	LOCH BORRALLAN BH.6.690	14.00	14.50	1FBC	98	290	42
PGD9041	LOCH BORRALLAN BH.6.690	14.50	15.10	1FBC	81	224	33
PGD9343	LOCH BORRALLAN	7.15	7.48	1ADC	88	217	36



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Loch Borrallan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	BH.6.840						
PGD9344	LOCH BORRALAN BH.6.840	7.48	8.27	1FBC	24	44	12
PGD9345	LOCH BORRALAN BH.6.840	8.27	9.12	1FBC	81	220	31
PGD9346	LOCH BORRALAN BH.6.840	9.12	9.61	1FBC	81	219	33
PGD9347	LOCH BORRALAN BH.6.840	9.61	9.98	1ADC	19	37	8
PGD9348	LOCH BORRALAN BH.6.840	9.98	10.83	1FFO	9	18	5
PGD9349	LOCH BORRALAN BH.6.840	10.83	11.14	1FBC	58	112	22
PGD9350	LOCH BORRALAN BH.6.840	11.14	11.35	1FBC	207	430	35
PGD9351	LOCH BORRALAN BH.6.840	11.35	12.00	1FFO	30	55	12
PGD9042	LOCH BORRALAN BH.6.840	12.00	12.50	1FBC	51	156	31
PGD9352	LOCH BORRALAN BH.6.840	12.50	13.10	1FBC	59	176	30
PGD9353	LOCH BORRALAN BH.6.840	13.10	13.68	1FBC	60	159	29
PGD9202	LOCH BORRALAN BH.6.840	13.50	14.00	1FBC	68	212	35
PGD9043	LOCH BORRALAN BH.6.840	14.00	14.50	1FBC	62	205	35
PGD9203	LOCH BORRALAN BH.6.840	14.50	15.00	1FBC	53	173	29
PGD9044	LOCH BORRALAN BH.6.840	15.00	15.63	1FBC	69	192	34

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Loch Borrailan Drillcore Data - Phosphate Project Boreholes

Sample Reference	Borehole	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD9354	LOCH BORRALAN BH.6.840	15.31	15.43	ICAD	127	237	33
PGD9355	LOCH BORRALAN BH.8.630	6.37	6.77	1FBC	98	290	68
PGD9356	LOCH BORRALAN BH.8.630	6.77	7.47	1CAG	119	511	204
PGD9357	LOCH BORRALAN BH.8.630	7.47	8.14	1CAG	96	381	151
PGD9358	LOCH BORRALAN BH.8.630	8.14	8.22	1FBC	79	231	52
PGD9359	LOCH BORRALAN BH.8.630	8.22	8.70	1CAG	104	375	143
PGD9360	LOCH BORRALAN BH.8.630	8.70	8.85	1FBC	40	90	29
PGD9045	LOCH BORRALAN BH.8.630	9.00	9.50	1CAG	147	612	238
PGD9361	LOCH BORRALAN BH.8.630	9.50	10.10	1CAG	113	450	202
PGD9362	LOCH BORRALAN BH.8.630	10.10	11.02	1CAG	117	453	203
PGD9046	LOCH BORRALAN BH.8.630	11.02	11.50	1FBC	66	212	33
PGD9363	LOCH BORRALAN BH.8.630	11.50	12.00	1FBC	134	336	22
PGD9364	LOCH BORRALAN BH.8.630	12.50	13.00	1FBC	82	208	44
PGD9365	LOCH BORRALAN BH.8.630	13.00	13.25	1CAG	97	268	38
PGD9366	LOCH BORRALAN BH.8.630	13.75	14.10	1FBC	47	117	29
PGD9367	LOCH BORRALAN BH.8.630	14.50	15.00	1FBC	66	175	33

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Loch Borralan Drillcore Data - Borehole 3

Sample Reference	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD7663	94.80	95.75	ICAD	102	192	25
PGD7664	95.75	96.21	ICAD	107	200	26
PGD7665	96.21	96.87	ICAD	96	170	23
PGD7666	96.87	97.60	2900	17	35	5
PGD7667	97.60	98.05	2900	60	115	16
PGD7668	98.05	98.60	2900	79	153	22
PGD7669	98.60	99.21	2900	19	38	3
PGD7670	99.21	99.47	2900	70	133	21
PGD7671	99.47	99.84	2900	41	73	5
PGD7672	99.84	100.40	2900	49	88	13
PGD7673	100.40	101.05	ICAE	50	97	21
PGD7674	101.05	101.73	ICAG	87	171	22
PGD7675	101.73	102.60	ICAG	79	139	17
PGD7676	102.60	103.05	ICAG	83	172	24
PGD7677	103.05	103.67	ICAG	83	179	25
PGD7678	103.67	104.42	ICAG	73	163	23
PGD7679	104.42	105.21	ICAG	72	159	23
PGD7680	105.21	105.73	ICAG	109	215	28
PGD7681	105.73	106.35	ICAG	95	190	26
PGD7682	106.35	107.00	ICAG	86	170	22
PGD7683	107.00	107.70	ICAG	82	171	24
PGD7684	107.70	108.40	ICAG	75	163	23
PGD7685	108.40	109.05	ICAG	90	187	26
PGD7686	109.05	109.75	ICAG	85	194	25
PGD7687	109.75	110.25	ICAG	82	172	22
PGD7688	110.25	110.50	ICAG	75	148	21
PGD7689	110.50	111.00	ICAG	81	162	23
PGD7690	111.00	111.70	ICAG	86	185	22
PGD7691	111.70	112.40	ICAG	79	175	23
PGD7692	112.40	113.20	ICAG	76	173	25
PGD7693	113.20	114.00	ICAG	81	173	24
PGD7694	114.00	114.65	ICAG	76	168	23
PGD7695	114.65	115.10	ICAG	79	185	27
PGD7696	115.10	115.80	ICAG	77	173	25
PGD7697	115.80	116.50	ICAG	75	182	23
PGD7698	116.50	117.21	ICAG	75	174	23
PGD7699	117.21	117.88	ICAG	74	158	23
PGD7700	117.88	118.45	ICAG	75	160	24
PGD7701	118.45	119.00	ICAG	75	170	23
PGD7702	119.00	119.55	ICAG	74	164	23
PGD7703	119.55	119.82	ICAG	78	138	18
PGD7704	119.82	120.40	ICAG	113	202	26
PGD7705	120.40	121.00	ICAG	115	201	27
PGD7706	121.00	121.80	ICAG	126	222	27
PGD7707	121.80	122.40	ICAG	100	173	24
PGD7708	122.40	122.60	ICAG	74	123	20
PGD7709	122.60	123.21	ICAG	82	158	23

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Loch Borrallan Drillcore Data - Borehole 3

Sample Reference	Top		Bottom		Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	Depth	Depth	Depth	Depth				
PGD7710	123.21	124.00	124.00	124.00	1CAG	47	89	25
PGD7711	124.00	124.40	124.40	124.40	1CAG	42	79	22
PGD7712	124.40	124.70	124.70	124.70	1CAG	33	51	16
PGD7713	124.70	125.10	125.10	125.10	1CAG	44	70	10
PGD7714	125.10	126.00	126.00	126.00	1CAG	61	85	8
PGD7715	126.00	126.50	126.50	126.50	1CAG	219	262	7
PGD7716	126.50	126.90	126.90	126.90	1CAG	42	60	6
PGD7717	126.90	127.45	127.45	127.45	1CAG	49	81	7
PGD7718	127.45	128.00	128.00	128.00	1CAG	80	119	14
PGD7719	128.00	128.40	128.40	128.40	1CAG	113	144	8
PGD7720	128.40	128.65	128.65	128.65	1CAG	66	94	9
PGD7721	128.65	129.50	129.50	129.50	1CAG	50	81	10
PGD7722	129.50	130.00	130.00	130.00	1CAG	32	53	11
PGD7723	130.00	130.80	130.80	130.80	1CAG	42	70	11
PGD7724	130.80	131.79	131.79	131.79	1CAG	42	68	15

Table 4 Rare earth element data for Loch Borrallan Borehole 4

Loch Borrallan Drillcore Data - Borehole 4

Sample Reference	Top Depth		Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
	Depth	Bottom Depth				
PGD7404	6.00	6.96	ICCF	107	375	180
PGD7405	6.96	8.26	ICCF	62	186	89
PGD7406	8.26	8.71	ICCF	103	332	120
PGD7407	8.71	8.85	ICCF	65	225	116
PGD7408	8.85	9.50	ICCF	92	296	116
PGD7409	9.50	10.15	ICCF	109	367	163
PGD7410	10.15	10.80	ICCF	103	350	143
PGD7411	10.80	11.13	ICCF	113	398	144
PGD7412	11.13	11.49	ICCF	70	223	99
PGD7413	11.49	12.00	ICCF	75	232	74
PGD7414	12.00	12.65	ICCF	75	270	90
PGD7415	12.65	12.86	ICCF	52	168	60
PGD7416	12.86	14.21	ICCF	80	263	101
PGD7417	14.21	14.45	ICCF	99	322	52
PGD7418	14.45	14.92	ICCF	93	292	83
PGD7419	14.92	15.45	ICCF	106	337	83
PGD7420	15.45	16.10	ICCF	87	272	92
PGD7421	16.10	16.42	ICCF	82	261	98
PGD7422	16.42	16.90	ICCF	92	278	83
PGD7423	16.90	17.53	ICCF	89	304	124
PGD7424	17.53	18.20	ICCF	59	252	166
PGD7425	18.20	18.56	ICCF	95	429	371
PGD7426	18.56	19.31	ICCF	73	254	209
PGD7427	19.31	19.98	ICCF	71	235	129
PGD7428	19.98	20.55	ICCF	10	21	5
PGD7429	20.55	20.74	ICCF	74	226	92
PGD7430	20.74	20.87	ICCF	29	85	70
PGD7431	20.87	21.05	ICCF	138	417	76
PGD7432	21.05	21.47	ICCF	45	130	28
PGD7433	21.47	21.99	ICCF	87	339	241
PGD7434	21.99	22.77	1FBE	87	258	53
PGD7435	22.77	22.96	1FBE	26	84	38
PGD7436	22.96	23.75	1CAD	22	38	9
PGD7437	23.75	24.06	ICCF	101	428	335
PGD7438	24.06	24.34	1FBE	113	391	129
PGD7439	24.34	24.59	1FBE	71	147	18
PGD7440	24.59	25.42	1FBE	69	207	62
PGD7441	25.42	25.67	1FBE	76	345	312
PGD7442	25.67	26.56	1FBE	87	268	65
PGD7443	26.56	27.14	1FBE	95	308	111
PGD7444	27.14	28.00	1FBE	77	234	57
PGD7445	28.00	28.20	1FBE	72	225	93
PGD7446	28.20	29.10	1FBE	72	234	59
PGD7447	29.10	30.05	1FBE	75	235	62
PGD7448	30.05	30.90	1FBE	72	244	85
PGD7449	30.90	31.65	1FBE	76	231	61
PGD7450	31.65	31.89	1FBE	21	60	22

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Loch Borrallan Drillcore Data - Borehole 4

Sample Reference	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD7451	31.89	32.65	1FBE	77	247	85
PGD7452	32.65	33.30	1FBE	93	281	71
PGD7453	33.30	34.29	1FBE	89	265	80
PGD7454	34.29	34.50	1FBO	83	266	66
PGD7455	34.50	34.85	1FBO	86	243	56
PGD7456	34.85	35.52	1FBO	73	233	92
PGD7457	35.52	35.80	1FBO	79	235	54
PGD7458	35.80	36.10	1FBO	71	224	82
PGD7459	36.10	36.71	1FBO	87	277	89
PGD7460	36.71	37.63	1FBO	61	184	13
PGD7461	37.63	38.15	1FBO	60	184	15
PGD7462	38.15	38.42	1FBO	63	184	19
PGD7463	38.42	38.90	1FBO	110	427	55
PGD7464	38.90	39.45	1FBO	82	251	18
PGD7465	39.45	40.10	1FBO	118	423	30
PGD7466	40.10	40.73	1FBO	80	250	25
PGD7467	40.73	41.10	1FBO	119	442	63
PGD7468	41.10	41.45	1CA0	28	85	17
PGD7469	41.45	41.79	1FBO	82	221	9
PGD7470	41.79	42.50	1FBO	80	239	20
PGD7471	42.50	43.00	1FBO	107	298	18
PGD7472	43.00	43.72	1FBO	85	254	26
PGD7473	43.72	44.40	1FBO	79	247	34
PGD7474	44.40	44.92	1FBO	65	214	14
PGD7475	44.92	45.34	1FBO	26	135	37
PGD7476	45.34	46.18	1FBO	69	266	58
PGD7477	46.18	46.93	1FBO	89	317	49
PGD7478	46.93	47.16	1FBO	62	195	30
PGD7479	47.16	47.70	1FBO	123	428	30
PGD7480	47.70	48.20	1FBO	102	355	31
PGD7481	48.20	49.01	1FBO	117	438	74
PGD7482	49.01	49.77	1FBO	76	236	21
PGD7483	49.77	50.10	1FBO	63	280	72
PGD7484	50.10	50.75	1FBO	81	229	20
PGD7485	50.75	51.70	1FBO	65	184	18
PGD7486	51.70	52.43	1FBO	67	181	28
PGD7487	52.43	52.76	1FBO	55	201	45
PGD7488	52.76	53.25	1FBO	87	229	35
PGD7489	53.25	53.45	1FBO	99	271	35
PGD7490	53.45	53.92	1FBO	73	221	39
PGD7491	53.92	54.77	1FBO	82	223	37
PGD7492	54.77	54.87	1FBO	93	247	29
PGD7493	54.87	55.55	1FBO	72	193	31
PGD7494	55.55	55.95	1FBO	91	251	36
PGD7495	55.95	56.55	1FBO	79	226	32
PGD7496	56.55	57.32	1FBO	103	269	32
PGD7497	57.32	57.96	1FBO	107	342	89

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Loch Borrallan Drillcore Data - Borehole 4

Sample Reference	Top Depth	Bottom Depth	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGD7498	57.96	58.77	1FB0	85	232	34
PGD7499	58.77	59.50	1FB0	60	158	25
PGD7500	59.50	60.03	1FB0	52	115	21
PGD7501	60.03	60.95	1FB0	69	172	25
PGD7502	60.95	61.75	1FB0	68	172	32
PGD7503	61.75	62.15	1FB0	57	158	28
PGD7504	62.15	63.18	1FB0	85	221	34
PGD7505	63.18	63.77	1FB0	76	204	32
PGD7506	63.77	64.06	1FB0	61	176	31
PGD7507	64.06	64.70	1FB0	84	235	37
PGD7508	64.70	65.38	1FB0	77	224	34
PGD7509	65.38	65.62	2S00	85	249	34
PGD7510	65.62	66.35	2S00	35	85	19
PGD7511	66.35	66.62	2S00	135	307	22
PGD7512	66.62	67.45	2S00	40	111	22
PGD7513	67.45	67.74	2S00	56	153	27
PGD7514	67.74	68.52	2S00	72	174	27
PGD7515	68.52	68.98	2S00	40	107	20
PGD7516	68.98	69.15	1CAD	255	657	57
PGD7517	69.15	70.15	2S00	36	83	16
PGD7518	70.15	70.74	2S00	48	117	21
PGD7519	70.74	70.86	2S00	47	114	20
PGD7520	70.86	71.70	2S00	41	121	23
PGD7521	71.70	72.70	2S00	43	106	18

Table 5 Rare earth element data for Loch Ailsh rocks

Loch Ailsh Rock Data

Sample Referenc	Eastings	Northings	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGR8080	232750	0912380	1CAD	727	739	9
PGR8081	232820	0912400	1FBO	43	85	11
PGR8082	232820	0912400	1FBO	31	64	12
PGR8083	232840	0912400	1FBO	65	191	27
PGR8084	232840	0912410	1CAO	3239	3956	28
PGR8085	232870	0912430	1CAD	122	174	12
PGR8086	232870	0912440	1FBC	20	45	20
PGR8087	232870	0912440	1CAD	1551	3669	33
PGR8088	232880	0912440	1CAD	136	187	15
PGR8089	232640	0912490	1CAD	34	76	14
PGR8090	232610	0912460	1CAD	32	81	11
PGR8091	232570	0912470	1CAD	23	56	9
PGR8092	232850	0912420	1FBC	181	320	26
PGR8093	232860	0912430	1FBC	44	101	20
PGR8094	232920	0912560	1CAD	49	95	8
PGR8095	232910	0912610	1CAD	110	121	10
PGR8096	232690	0912520	1CAD	41	89	11
PGR8097	232690	0912520	1CAD	61	112	13
PGR8098	232710	0912520	1CAD	49	95	7
PGR8099	232520	0912450	1CAD	22	55	7
PGR8100	232390	0912440	1CAD	32	60	8
PGR8101	232400	0912450	1CAD	37	86	12
PGR8102	232580	0912710	1CAE	32	55	12
PGR8103	232580	0912710	1CAD	49	71	17
PGR8104	232580	0912710	1CAD	41	96	13
PGR8105	232540	0912660	1CAD	29	58	6
PGR8106	232520	0912620	1CAE	25	57	13
PGR8107	232520	0912620	1CAD	14	48	8
PGR8108	232730	0912380	1FBC	57	127	20
PGR8109	232730	0912380	1FBC	52	125	21
PGR8110	232890	0912390	1CAG	118	202	23
PGR8111	232890	0912390	1F00	22	53	13
PGR8112	232870	0912400	1FBC	137	238	24
PGR8113	232870	0912400	1FBC	830	1166	19
PGR8114	233020	0912430	1FBC	69	154	38
PGR8115	233020	0912430	1FBC	67	173	43
PGR8117	233060	0912410	2500	22	48	9
PGR8118	233060	0912410	1FBC	40	109	21
PGR8119	233060	0912410	2500	12	20	9
PGR8120	233060	0912410	2000	53	128	27
PGR8122	232730	0912380	1CAD	19	41	8
PGR8123	232720	0912370	1FBC	23	56	13
PGR8124	232730	0912380	1FBC	21	43	13
PGR8125	232730	0912380	1FBC	25	44	16
PGR8126	232730	0912380	1FBC	140	279	27
PGR8127	232730	0912380	1FBC	61	149	22



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Loch Ailsh Rock Data

Sample Referenc	Eastings	Northings	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGR8128	232730	0912380	1FBC	19	44	13
PGR8129	232730	0912380	1FBC	38	71	16
PGR8130	232730	0912380	1FBC	85	185	23
PGR8131	232730	0912380	1FBO	24	57	14
PGR8132	233000	0912460	1FBC	193	323	41
PGR8133	233000	0912460	1CAD	25	46	6
PGR8134	233240	0912610	1CAD	11	35	10
PGR8135	233370	0912640	1FBC	73	204	30
PGR8137	233370	0912640	1CAD	15	41	8
PGR8138	233420	0912690	1FBC	74	213	35
PGR8139	233420	0912690	1FBC	125	322	41
PGR8140	233460	0912710	1CAD	90	191	25
PGR8141	233460	0912710	1FBC	73	197	33
PGR8142	233520	0912740	1FBC	89	219	24
PGR8143	233520	0912740	1FBC	115	306	38
PGR8144	233530	0912760	1CAD	154	176	20
PGR8145	233600	0912820	1FBC	37	106	25
PGR8146	233590	0912820	2500	80	195	34
PGR8147	233600	0912740	2500	38	86	17
PGR8148	233750	0912720	1CAD	77	150	15
PGR8149	233680	0912720	2R00	2	0	0
PGR8150	233550	0912610	2R00	7	15	2
PGR8151	233550	0912610	2500	31	57	10
PGR8152	233570	0912750	2800	68	120	17
PGR8153	233570	0912750	1CAD	30	68	11
PGR8154	233570	0912750	2800	26	65	17
PGR8155	233480	0912600	2800	55	148	34
PGR8156	233390	0912710	3T0G	39	80	21
PGR8157	233290	0912700	2800	47	96	16
PGR8158	232610	0912750	1CAE	40	87	16
PGR8159	233190	0913220	2500	31	58	12
PGR8160	234770	0914910	1CAG	31	63	20
PGR8161	233060	0912410	2500	35	65	13
PGR8162	233060	0912410	2500	5	13	2
PGR8163	233060	0912410	2500	29	65	15
PGR8164	233060	0912410	2500	51	114	23
PGR8165	233060	0912410	2000	38	79	14
PGR8166	232810	0912400	1FBC	44	112	20
PGR8167	232770	0912380	1FBC	32	81	16
PGR8168	232770	0912380	1FBC	55	91	16
PGR8169	232680	0912310	1000	7	17	6
PGR8170	232630	0912280	1CAG	136	196	19
PGR8171	232630	0912280	1CAD	92	123	16
PGR8172	232620	0912270	2800	146	336	40
PGR8173	232620	0912270	2800	147	182	18
PGR8174	232630	0912280	1CAD			

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Loch Ailsh Rock Data

Sample Referenc	Easting	Northing	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGR8175	232730	0912360	ICAD	46	85	13
PGR8176	232730	0912360	IFBC	95	162	19
PGR8177	232730	0912760	IFBC	26	63	15
PGR8178	232620	0912270	2800	240	482	37
PGR8179	232620	0912280	2800	339	688	58
PGR8180	232620	0912280	1000	99	221	25
PGR8181	232620	0912280	ICAE	10	21	3
PGR8182	232620	0912280	IFBC	90	199	22
PGR8183	232610	0912270	IFBC	111	281	35
PGR8184	232590	0912270	ICAD	9	20	8
PGR8185	232580	0912260	ICAD	18	40	7
PGR8186	232590	0912270	IFBC	71	186	30
PGR8187	232580	0912250	ICAD	25	54	11
PGR8188	232570	0912190	2S00	6	13	4
PGR8189	232570	0912190	2S00	15	32	7
PGR8190	232160	0913730	ICAD	59	93	10
PGR8191	232150	0913840	2800	181	234	24
PGR8192	231780	0913120	ICAD	28	62	10
PGR8193	231840	0913190	ICAG	7	11	10
PGR8194	231880	0912630	ICAD	53	130	8
PGR8195	232050	0912570	ICAD	42	96	10
PGR8196	232430	0914820	ICAE	8	14	19
PGR8197	233330	0913660	ICAG	7	24	2
PGR8198	233090	0914010	ICAD	58	87	24
PGR8199	231540	0911580	4IG0	7	16	2
PGR8200	232190	0911800	3P00	54	114	25
PGR8201	234800	0914790	IFBC	24	57	20
PGR8202	232430	0911890	2R00	3	3	1
PGR8203	232410	0911850	2R00	12	25	5
PGR8204	232870	0912440	ICAD	22	45	15
PGR8205	232400	0912450	ICAD	38	89	9
PGR8206	232400	0912450	2800	33	70	8
PGR8207	232540	0912680	ICAG	46	76	14
PGR8208	232530	0912670	ICAD	36	74	8
PGR8209	232400	0912480	ICAD	64	130	14
PGR8220	232190	0911800	2900	32	89	39
PGR8224	231520	0915410	2V00	27	55	16
PGR8225	232110	0915550	1FB0	6	6	13
PGR8226	232480	0915230	1FB0	320	717	65
PGR8227	232480	0915230	2800	455	778	43
PGR8228	233330	0915420	2000	32	79	28
PGR8229	233330	0915420	1CA0	62	153	21
PGR8230	233330	0915420	ICAD	61	125	17
PGR8231	232580	0912110	1FBC	32	60	17
PGR8232	232580	0912100	1FBC	48	96	19
PGR8233	232590	0912100	1FBC	68	118	18
PGR8234	232590	0912100	2S00	18	35	10

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Loch Ailsh Rock Data

Sample Referenc	Eastings	Northings	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGR8239	232590	0912100	2S00	15	47	10
PGR8240	232590	0912100	2S00	48	98	21
PGR8241	232590	0912100	2S00	28	54	10
PGR8242	232590	0912100	2S00	43	109	26
PGR8308	233670	0912720	2R00	7	16	2
PGR8309	233550	0912610	2R00	9	17	2
PGR8310	232781	0912614	1FBC	148	241	30
PGR8312	232835	0912630	1FBC	36	62	9
PGR8350	233530	0912750	7D11	11	18	
PGR8351	233530	0912748	2V00	164	322	39
PGR8351A	233530	0912748	2V00	11	39	6
PGR8351B	233530	0912748	2V00	52	132	25
PGR8352	233531	0912752	1FBC	88	230	31
PGR8353	233282	0912698	1CAD	113	159	19
PGR8354	233290	0912700	4370	43	96	23
PGR8355	233280	0912695	4370	38	92	20
PGR8357	233735	0912725	1CAD	16	43	7
PGR8359	233335	0912490	1ABE	29	59	12
PGR8360	234940	0914654	1ADC	20	49	18
PGR8361	234792	0914810	1CA0	11	25	4
PGR8362	234780	0914840	1ADC	29	65	19
PGR8363	234336	0914971	1000	96	238	33
PGR8363A	234336	0914971	1000	0	5	2
PGR8363B	234336	0914971	1000	81	193	28
PGR8364	234328	0914990	1CA0	94	210	31
PGR8365	234320	0915040	1CA0	77	152	21
PGR8366	234320	0915010	1CA0	176	245	8
PGR8370	233250	0913116	1CA0	63	139	14
PGR8372	233250	0913116	1CA0	433	886	97
PGR8373	233250	0913116	1CA0	378	827	81
PGR8374	233132	0913395	1CA0	18	39	6
PGR8375	233303	0913535	1CA0	78	151	20
PGR8376	232808	0912400	1FBC	66	135	19
PGR8377	232812	0912406	1FBO	860	1456	21
PGR8379	232822	0912396	2800	204	570	66

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Loch Ailsh Rock Data

Sample Referenc	Eastings	Northings	Major rock type	La (ppm)	Ce (ppm)	Y (ppm)
PGR8380	232822	0912396	1FB0	836	1145	11
PGR8381	232813	0912406	2800	709	1210	56
PGR8382	232815	0912406	2800	64	106	3
PGR8383	232816	0912405	1CA0	221	253	6
PGR8384	232816	0912404	1C00	126	228	14
PGR8384A	232816	0912404	1C00	34	48	2
PGR8385	232816	0912404	2V00	69	213	26
PGR8386	232826	0912397	1FB0	183	342	15
PGR8386A	232826	0912397	1FB0	226	389	
PGR8387	232585	0912270	1FB0	63	174	31
PGR8388	232582	0912270	1CA0	28	79	12
PGR8389	232582	0912270	1FB0	73	179	32
PGR8390	232583	0912270	1FB0	59	158	31
PGR8391	232583	0912269	1FB0	105	293	45
PGR8392	232583	0912269	1FB0	132	398	53
PGR8393	232585	0912269	1CA0	24	67	12

Table 6 Rare earth element data for Loch Ailsh stream sediments

Loch Ailsh Stream Sediment Data				La	Ce	Y
Sample Reference	Easting	Northing	(ppm)	(ppm)	(ppm)	
PGC8001	232570	0912210	100	171	22	
PGC8002	232770	0912380	111	180	21	
PGC8003	232850	0912420	850	1108	22	
PGC8005	233160	0912480	71	129	25	
PGC8006	233370	0912640	90	202	29	
PGC8007	234460	0914420	79	137	27	
PGC8008	233320	0912750	79	142	20	
PGC8009	234330	0914760	77	148	22	
PGC8010	233340	0913660	66	103	19	
PGC8011	234140	0914830	50	70	16	
PGC8012	232590	0914290	28	37	13	
PGC8014	232500	0913550	31	50	13	
PGC8016	231850	0913260	48	56	14	
PGC8018	231970	0912940	62	82	16	
PGC8020	232050	0912570	77	125	23	
PGC8025	233068	0912248	27	42	22	
PGC8026	233138	0912425	45	77	27	
PGC8027	233390	0912645	71	146	26	
PGC8031	234495	0914920	52	77	12	
PGC8032	234663	0914440	76	151	29	
PGC8033	234469	0914867	41	81	12	
PGC8034	234338	0914960	55	123	17	
PGC8035	234120	0914881	50	94	19	
PGC8050	234495	0914921	33	65	11	

Table 7 Rare earth element data for Loch Ailsh panned concentrates

Sample Reference	Easting	Northing	La (ppm)	Ce (ppm)	Y (ppm)
PGP8001	232570	0912210	117	140	16
PGP8002	232770	0912380	89	132	14
PGP8003	232850	0912420	1171	1691	20
PGP8005	233160	0912480	52	105	21
PGP8006	233370	0912640	53	108	24
PGP8007	234460	0914420	80	185	36
PGP8008	233320	0912750	73	119	22
PGP8009	234330	0914760	101	249	48
PGP8010	233340	0913660	59	107	25
PGP8011	234140	0914830	51	107	34
PGP8012	232590	0914290	25	29	12
PGP8014	232500	0913550	19	17	6
PGP8016	231850	0913260	27	38	11
PGP8018	231970	0912940	50	65	13
PGP8020	232050	0912570	45	101	60
PGP8025	233068	0912248	30	47	18
PGP8026	233138	0912425	31	69	21
PGP8027	233390	0912645	51	127	27
PGP8031	234495	0914920	28	48	11
PGP8032	234663	0914440	116	298	50
PGP8033	234469	0914867	46	100	23
PGP8034	234338	0914960	60	160	26
PGP8035	234120	0914881	64	153	48
PGP8050	234495	0914921	19	42	11

Table 8 Rare earth element data for Ben Loyal rocks

Ben Loyal Rock Data				La	Ce	Y
Sample Reference	Easting	Northing	Major rock type	(ppm)	(ppm)	(ppm)
PGR8401	261215	0947265	1CA0	61	124	13
PGR8402	261210	0947250	1CA0	95	203	21
PGR8403	261215	0947265	1CA0	300	778	63
PGR8404	261140	0947200	1CA0	334	1005	72
PGR8405	260940	0947120	1CA0	203	347	25
PGR8406	260940	0947115	1CA0	201	406	33
PGR8408	260510	0945980	1CA0	75	217	35
PGR8408	260510	0945980	1CA0	526	1672	95
PGR8409	260530	0945960	1CA0	120	385	35
PGR8410	261235	0949760	1CA0	148	280	21
PGR8411	261280	0949740	1CA0	178	278	12
PGR8412	261480	0946100	4H00	4598	17895	289
PGR8413	261500	0946090	1CA0	5667	19785	173
PGR8414	257910	0950240	1CA0	163	315	21
PGR8415	257140	0950230	1CAF	9	32	9

**Table 9** Rare earth element data for Ben Loyal stream sediments

Ben Loyal Stream Sediment Data			
Sample	Reference N	Eastings	Northings
PGP8036	261399	0948768	322
PGP8037	261689	0946062	703
PGP8038	259200	0947819	217
PGP8039	259148	0947763	145
PGP8040	261260	0947300	283
PGP8041	258601	0950898	159
PGP8042	257782	0950780	256
PGP8043	257118	0950242	180
			La (ppm)
			Ce (ppm)
			Y (ppm)
			56
			79
			42
			29
			57
			29
			35
			37



Table 10 Rare earth element data for Ben Loyal panned concentrates

Ben Loyal Panned Concentrate Data				La	Ce	Y
Sample Reference	Easting	Northing	(ppm)	(ppm)	(ppm)	(ppm)
PGP8036	261399	0948768	515	1409	92	
PGP8037	261689	0946062	508	1300	58	
PGP8038	259200	0947819	170	549	76	
PGP8039	259148	0947763	168	612	95	
PGP8040	261260	0947300	171	501	51	
PGP8041	258601	0950898	66	169	26	
PGP8042	257782	0950780	52	167	26	
PGP8043	257118	0950242	118	353	48	

**Table 11** Major rock type code classifications

*1 Igneous rocks*

1ADC Meladiorite

1C00 Syenite Group

1CA0 Syenite, undifferentiated

1CAD Leucosyenite

1CAE Melasyenite

1CAF Quartz-syenite

1CAG Pyroxene-syenite

1CCF Borolanite

1CCJ Melanite-syenite

1F00 Pyroxenite Group

1FB0 Pyroxenite, undifferentiated

1FBC Hornblende-pyroxenite

1FBE Cromaltite

1FF0 Serpentinite

1G00 Lamprophyre group

*2 Metamorphic rocks*

2900 Quartzite

2M00 Calc-silicate rock

2R00 Marble

2S00 Skarn

2SDN Garnet-pyroxene skarn

*3 Chemical/ biochemical rocks*

4H00 Dolomite and calcite

*4 Minerals*

7D11 Quartz

7H10 Carbonate