

6EM08046
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**Fluoride in vegetation in the vicinity of
ISAL – Alcan Iceland Ltd.**

Complete data 2011

March 2012
Chemical Analysis,
Innovation Center Iceland

This report is prepared for ISAL (RioTintoAlcan) by the Chemical Analysis Laboratory, Innovation Center Iceland (Efnagreiningar, Nýsköpunarmiðstöð Íslands), which performed the sampling and data analysis. Sample preparation and measurement were performed by the Agricultural University Chemical Laboratory.

Keldnaholt, March 26th, 2011

We hereby confirm that the results as presented are as obtained by the laboratories joint effort and faithfully represent the status of the variables investigated in the vicinity of ISAL in 2011.

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SAMPLING POINTS

A1

Sampling Point No.	Species*)	Name	Distance from Plant (km)	Zone	Direction from Plant
1	G	Straumur	1,3	0	WSW
6	G,L,N	Park Hafnarfjörður	4,3	1	NE
7	G,L,N	Vífilstaðahlíð	7,8	3	E
8	G	Sviðholt	6,1	2	NNE
9	G	Dysjar	4,1	1	NNE
10	G,L	Vífilstaðir	7,7	3	ENE
19	W	Kaldársel	8,4	3	ESE
26	G,L,N	Skorradalur	59,0	4	NNE
27	G	Hvassahraun (official since 1986)	6,3	2	SW
31	N	Gerði	1,0	0	SSW
32	N	Straumsgirðing	3,7	1	SE
34	G,L,N	Hvaleyrarvatn	5,7	2	ESE
37	N	Garðaholt	5,0	2	NNE
38	N	Sléttuhlíð	7,3	3	ESE
41	L,N	Öskjuhlíð (official since 1986)	10,2	3	NNE

Number of Samples per Zone and Species

Zone	G fertilized	G not fertilized	L	N	W
0	none	2	none	2	none
1	none	3	4	6	none
2	none	8	6	8	none
3	none	4	6	8	none
4	none	2	4	2	none
Total	none	19	20	26	none

*) G: Grass, L: Leaves, N: Needles, W: Water

Several sampling points were deleted in 2007, see previous reports for original sampling points

DEFINITION OF THE ZONES

A2

Reference Point (RP), according to the Master Agreement, Article 12.01:

Center of the potroom of the first stage of the smelter.

Zone 0: Identical to Zone of Limited Liability, (according to the Master Agreement, Annex II to Exhibit C)

defined by the imaginary lines:

- a) 3 km SE from the RP, parallel to the potroom length axis.
- b) 2 km NE from the RP, rectangular to a).
- c) 3 km SW from RP, rectangular to a).

Zone 1: Inner line of demarcation: same as the line of demarcation of the zone of limited liability. Outer line of demarcation: Radius of 4,5 km from RP.

Zone 2: Circular ring, demarked by an inner radius of 4,5 km and an outer radius of 6,5 km from RP.

Zone 3: Circular ring, demarked by an inner radius of 6,5 km and an outer radius of 15 km from RP.

Zone 3a: Circular ring, demarked by an inner radius of 15 km and an outer radius of 50 km from RP.

Zone 4: Inner line of demarcation: Radius of 50 km from RP. No outer line of demarcation.

PRESENTATION OF THE RESULTS

A3

SAMPLING

In past years and decades several changes have been made to the measurement sampling plan, reflecting changes in land use, farming practice and vegetation. The sampling plan in 2011 is unchanged from previous year, the most recent changes made in 2007. Please refer to previous reports for original sampling points and changes.

The time of sampling depends on the progress of growth and varies from end of June to beginning of July for the so-called spring samples and from end of September to beginning of October for the fall samples. The control of the sampling is jointly organized by the Innovation Center Iceland and RioTintoAlcan with Umhverfisstofnun acting as environmental control authority.

PREPARATION AND ANALYSIS

The samples have been analysed by the potentiometric method using ion specific fluoride electrode. Samples are collected, weighed and put in cool storage. Before measurement samples are washed and dried. When dry, they are weighed again and then milled to 1 mm or less particle size. Fluoride is determined both in the milled sample and in the washwater collected from each sample. Fluoride content is calculated per dry matter as found after drying a milled sample at 1 hr at 105°C.

RESULTS

The averages per spring + fall as well as the zonal averages are derived from the analysis results. The averages for the combined zones 1 + 2 + 3 are calculated from the individual sampling point values, but not from the zonal averages.

In the early nineties there was a significant lowering of fluoride content in the vegetation as can be seen from the following tables and graphs. The average fluoride content in most cases since in zones 1-3 is less than 5 ppm for grass and needles and less than 10 ppm for leaves.

The results for year 2011 are similar to the preceding years in that respect with overall average of grass in zones 1-3 of 5 ppm, leaves of 6 ppm and needles of 4 ppm.

The results are though overall slightly different. The washing solution measurements are generally low this year, these results usually are highly dependent on weather conditions prior to sampling. In general there was much greater precipitation this year than previous years, but not immediately prior to sampling. In June there was a spell of strong northerly winds although the month was dry. The low wash values in the fall may have a similar reason, the wind in the period prior to sampling was predominantly northerly or northeasterly.

On the other hand, the values in vegetation are overall just slightly higher than the low values of previous years. The results are though within the normal variation of values detected since 1992.