Veðurstofa Íslands
Report

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Heavy metals and persistent organic pollutants in air and precipitation in Iceland

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Abstract

At *Stórhöfði*, the southern tip of Heimaey island off the south coast of Iceland, three samples are collected twice a month for the analysis of heavy metals in air and of persistent organic pollutants in both precipitation and air. The concentration of heavy metals in air (1995) is generally low; interelement correlation suggests at least two sources. The concentration of POPs (1995 and 1996) is mostly low; the occurence of the various substances is similar in precipitation and in air with a few distinct differences. At two stations in southwest Iceland monthly precipitation samples are collected for the analysis of heavy metals: *Írafoss*, in a sparsely populated agricultural area and *Reykjavík*, an urban area of about 150,000 inhabitants. The results (1992 - 1996) are suspiciously high for some elements while for other elements they are low and compare well with results from the Norwegian west coast.

Á *Stórhöfða* í Vestmannaeyjum er safnað þremur sýnum á hálfs mánaðar fresti til greiningar á þungmálmum í lofti og þrávirkum lífrænum efnum í bæði úrkomu og lofti. Styrkur þungmálma í lofti (1995) er yfirleitt lágur en innbyrðis fylgni bendir til þess að um tvær eða þrjár uppsprettur sé að ræða. Styrkur þrávirkra lífrænna efna (1995 og 1996) er að mestu leyti lágur og með fáum en skýrum undantekningum eru hlutföll þeirra í lofti og úrkomu svipuð. Á tveimur stöðum á suðvesturlandi er mánaðar-sýnum safnað til greiningar á þungmálmum í úrkomu: við virkjunina á *Írafossi* og við Veðurstofuna í *Reykjavík*. Styrkurinn mælist (1992 - 1996) tortryggilega hár fyrir suma málma en meðalstyrkur annarra málma er jafn lágur og á vesturströnd Noregs eða lægri.

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Foreword

Most of the following results were originally prepared for and presented at the EMEP-WMO workshop on data-analysis, reporting and validation in Ústí nad Labem in the Czech Republic in April 1997; both as a poster and a short oral contribution.

1. Introduction

Fig. 1 (Appendix C) shows the location of Iceland in the North Atlantic and of the three stations where, on behalf of the Icelandic Meteorological Office, air and/or precipitation are sampled for the analysis of heavy metals or persistent organic pollutants (POPs). Descriptions of the three stations (Appendix A) give the location, surroundings, project status, sampling techniques, parameters, analytical methods, detection limits and quality assurance as regards the measurement of heavy metals and POPs.

Tables with results of measurements of Icelandic samples, as well as figures illustrating these results, contain unfiltered data; no measurement has been rejected.

2. Stórhöfði

Figs. 2a and 2b show the surroundings at the Stórhöfði station, the sampling equipment for heavy metals in air and the sampling equipment for persistent organic pollutants in both precipitation and air.

In either case the air sampling methods cannot distinguish between particulate concentration and gaseous concentration; for any element or substance the result is the sum of concentration in the solid and vapour phases. Such matrix is sometimes referred to as air+aerosol but for convenience the term "air" is used here.

2.1 Heavy metals in air sampled in 1995

2.1.1 Description

The heavy metals described here are *trace elements* in rocks but one of the major elements in rocks, **Al**, was analysed also. The air samples

roughly reflect this aspect of rock composition (fig. 3): The average concentration of **Al** is 349 ng/m^3 while the average concentrations of the heavy metals are < 7 ng/m^3.

Excluding **Al** (fig. 4), *average concentrations* (ng/m^3) of the trace elements are: **Zn** 6.5, **Cr** 3.6, **Ni** 3.0, **Cu** 1.5, **Pb** 1.0, **As** 0.3 and **Cd** 0.04 (p. B3). All **Se** results were below detection limit (p. B2).

Graphs of *monthly variations* in the concentration of each trace element (figs. 5, 6 and 7) show the contrasting covariations from May onwards of **Cr** and **Ni** on one hand and that of **Zn** and **Cu** on the other, while during the first three months **Cr** and **Zn** seem to covariate but **Cu** and **Ni** do not change much. The concentration of **Pb** and **Cd** changes little throughout the year while that of **As** jumps from 0.1 ng/m^3 or less in the first half of the year to 0.3 ng/m^3 or more from June onwards. None of these changes are obviously seasonal.

2.1.2 Discussion

This data suggests two or even three different *sources* for heavy metals in air at Stórhöfði; rock dust, either local or from the glacial sandur areas ashore, local or regional anthropogenic activity and long-range transmission of pollutants are possible explanations. The sampling period is short but data on samples from 1996 will soon be available.

The Norwegian Institute for Air Research, NILU, have presented graphically the results of measurements of Cd and Pb in air *within the ECE region* in 1993 and 1994 (EMEP/CCC Report 8/96, figs. 4 and 5); maps produced by kriging[1] show nine or ten categories of increasing concentration towards southern and central Europe. Allocating the now available Icelandic data (1995), Cd results would fall in the lowest Cd-category (Cd < 0.1 ng/m^3) and Pb results would fall well within the definition of the lowest Pb-category (Pb < 5 ng/m^3). Lowest categories of both Cd and Pb are mainly represented by data from Spitzbergen and parts of Norway.

A report on the state of the *Arctic environment* has been published recently under the auspices of the Arctic Monitoring and Assessment Programme (AMAP, 1997) describing, among other issues, the levels of heavy metals in air.

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[1] Interpolation of results from irregular to regular grids (Journel and Huijbregts, 1981) using spatial correlation where measurements exist and estimating data where no measurements exist.

Graphs (page 100) show winter air concentrations (ng/m^3) of heavy metals at five circumpolar stations[2] in 1990. Approximate ranges are for Pb 0.9 - 2.5, for Cu 0.4 - 2.7, for As 0 - 0.3, for Zn 0.8 - 5.5 and for Ni 0.1 - 2.1 ng/m^3 while the Stórhöfði annual averages are 1.0, 1.5, 0.3, 6.5 and 3.0 ng/m^3, respectively. Closer look reveals that compared with these Arctic stations Stórhöfði values are low for Pb, similar for Cu and As but somewhat higher for Zn and Ni. The situation in the Arctic is such that the concentration of heavy metals in air is higher in winter than in summer by more than one order of magnitude (AMAP, 1997, p.99); hence, annual averages are lower than winter concentrations. Annual averages for Zn and Ni are therefore distinctly higher at Stórhöfði than in the Arctic.

A gradient of increasing air concentration (page 100) is shown for As, Cu and Ni at north-Norwegian stations[3] on a 90 km stretch at the Russian border, approaching the metal smelters[4] on the Kola peninsula: Approximate values (ng/m^3) are As from 0.5 to 2.5, Cu from 2.5 to 11.0 and Ni from 1.5 to 13.0. At a low-reference station[5] in south Norway the concentrations of As, Cu and Ni are approximately 0.5, 1.5 and 1.0 ng/m^3 which means that Stórhöfði is lower in As (0.3), similar in Cu (1.5) but higher in Ni (3.0) although far from being as high as the highest concentrations above.

2.2 Persistent organic pollutants in precipitation and air sampled in 1995 and 1996

The persistent organic pollutants are *synthetic* organic chemicals that break down slowly or very slowly in the environment. HCB (hexa-chlorobenzene) and PCBs (polychlorinated biphenyls) are industrial chemicals or byproducts, unintentionally toxic, but others are insecticides or herbicides intended to be toxic: chlordanes, dieldrin, HCH (hexa-chlorocyclohexane; alpha-, beta- and gamma isomers) and DDT. In the environment DDT is partly converted to DDE and DDD (metabolites).

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[2] From 64° - 82°N: 1) Poker Flat, Alaska, USA 2) Severnaya Zemlya, off Siberian coast, Russia 3) Ny-Ålesund, Spitzbergen, Norway 4) Independence fjord, Greenland 5) Alert, Ellesmere Island, Canada.
[3] Between 69°N - 70°N: Noatun, Kobbfoss, Svanvik, Holmfoss, Karpdalen and Viksjøfjell.
[4] At Nikel, Zapoljarnyy and Pechenga, just south of 70°N.
[5] Birkenes at 58°N, far from the metal smelters in the north.

2.2.1 Description

The *main results* are presented in figs. 8, 9 and 10 where related substances are placed on the horizontal axis (HCHs, DDTs, HCB, chlordanes, dieldrin and PCBs) yielding a POPs profile for the parameter on the vertical axis: annual sum deposition[6] (pp. B10 and B17), annual weighted mean concentration in precipitation[7] (pp. B9 and B16) or annual average concentration in air[8] (pp. B6 and B13).

For *precipitation* the profile of the annual weighted mean concentration (range 0 - 0.76 ng/l) of the substances is similar for the two years (fig. 9), which supports the validity of the data. Values for HCHs, HCB, DDTs and the lighter PCBs (-28, -31, -52) are, however, lower in 1996 than the year before and values for most of the heavier PCBs (-105 etc.) are higher. Values for chlordanes are very low during both years.

For *air* the profile of the annual average concentration (range 0 - 17.5 pg/m^3) of the substances is fairly similar for the two years (fig. 10) with the distinct exceptions of p,p'-DDT[9] and PCB-52. As in the other matrix (i.e. precipitation), values for HCHs, HCB and the lighter PCBs are mostly lower in 1996 than the year before and values for the heavier PCBs are higher.

The annual concentration profiles of POPs in precipitation are fairly *similar* to those of POPs in air apart from HCB which is of comparatively low concentration in precipitation but high in air (figs. 9 and 10). Also chlordanes concentration is somewhat higher in air than in precipitation.

Two-weekly variation in *deposition* (ng/m^2) during the two years is presented for each substance (figs. 11 - 16). **DDTs** are almost absent in the later half of 1995; there is a shift from p,p'-DDD to p,p'-DDT as the most prominent species but both peak in early July 1995. **PCBs** and **HCB** are present in almost every sample; their deposition and that of **dieldrin** seems to fluctuate less in 1996 than in 1995. For **HCHs** α-HCH is dominant; lindane (γ-HCH) is first absent but persists after an initial peak in late May 1995. The presence of **chlordanes** in

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[6] Concentration (ng/l) in a precipitation sample multiplied by precipitation amount (mm = l/m^2) during the sampling period, see also Appendix A (Stórhöfði description, p. A2).
[7] The annual sum of deposition (see footnote 6) divided by the annual precipitation amount.
[8] Arithmetic average: sum of concentration values divided by number of concentration values.
[9] For the nomenclature of the organochlorines see Appendix A (footnotes, p. A3).

precipitation is most erratic of all the POPs but a shift from cis-CD to trans-CD and perhaps trans-NO (only analysed in 1996) can be seen.

Two-weekly variation in *air* concentration (pg/m^3) during the two years is presented for each substance (figs. 17 - 22). **DDTs** are almost absent in the later half of 1995; there is a shift from p,p'-DDD to p,p'-DDT as the most prominent species and the latter peaks in early 1996. **PCBs** are present in almost every sample but otherwise little regularity is seen. **HCB** has a comparatively high concentration in air; the values seem to fluctuate less in 1996 than in 1995. **Dieldrin** is absent in 1995 after a single early peak, but present in almost every 1996 sample and during that time the values do not fluctuate much. For **HCHs** α-HCH is dominant but lindane (γ-HCH) is, however, ubiquitous and peaks in late May 1995. **Chlordanes** are present in virtually every sample of air; chlordanes concentration is lowered and stablized from the middle of 1995 onwards and during that period the concentrations of cis-CD, trans-CD and trans-NO (only analysed in 1996) are similar most of the time.

Comparing matrices (precipitation (as deposition) and air): In both matrices there is a general tendency for the values to fluctuate in 1995, especially the first half, but become more stable after that. Peaks in air rarely coincide with peaks in deposition but only the latter is influenced by precipitation amount. The behaviour of **DDTs** is fairly similar in both matrices. In both, **PCBs** are present in almost every sample. **HCB** is the only substance of which the relative concentration is very different in the two matrices. **Dieldrin** occurs erratically in 1995 precipitation while practically absent from 1995 air; in 1996 it is stable in both. The behaviour of the **HCHs** is not dissimilar in the two matrices except for lindane (γ-HCH) in early 1995. The occurence of **chlordanes** is very different in the two matrices. Similar changes happen in **annual averages** from 1995 to 1996 in both matrices: a decrease in HCH, HCB and most of the lighter PCBs but an increase in most of the heavier PCBs.

Three additional substances, analysed for in all samples from 1996, proved to be *absent:* aldrin, isodrin and endrin.

POPs contents in cotton wool used for *cleansing* (pp. B8 and B15) are moderate or high which is considered accidental. *Flies* and *dirt* (pp. B12 and B15) in some samples seem to have no effect on POPs content. Even when the effect of reduced air flow has been corrected, *seasprey salt* (pp. B6 and B13) in air samples seems to correlate with low

concentration of most POPs; it is not clear whether this reflects the origin of the air mass in such weather conditions or a difficulty in extracting the POPs from salt blocked air foam plugs.

2.2.2 Discussion

NILU have presented graphically the concentration of α-HCH, γ-HCH and HCB in *precipitation* (annual weighted means, 1993) from stations in Germany, Denmark and Norway[10] (EMEP/CCC-Report 8/96, fig. 6). The range for α-HCH is about 1 - 2 and for γ-HCH about 8 - 16 ng/l, which is much higher than at Stórhöfði (maximum 0.76 ng/l). At all three stations the γ-HCH/α-HCH ratio is high: about 9 in Germany, about 15 in Denmark, attributed to a local source of lindane which was still being applied in 1993, and about 4 in Norway, due to both low γ-HCH and high α-HCH.

The Norwegian results are tentatively explained in the report by the photochemical conversion of γ-HCH to α-HCH and/or the use of technical HCH[11] in eastern countries at similar latitudes (the station is at 58°N). At Stórhöfði the γ-HCH/α-HCH ratio is about 0.6 (0.58 and 0.66, pp. B9 and B16) which confirms a trend given by Germany and Norway: lower at higher latitudes. However, lindane (γ-HCH) was much used in Icelandic sheep farming until 1990[12] but as the half-life for the environmental degradation of lindane varies from a few days up to 3 years (WHO 1991, Health and Safety Guide 54) its effects have receded.

At the European stations the HCB concentration (about 0.3 - 0.4 ng/l) is lower than the HCHs' and described as being in accordance with the global uniform HCB concentration. It is noteworthy and perhaps somewhat suspicious that HCB at Stórhöfði is much lower: annual weighted mean concentration (ng/l) for 1995 and 1996 is 0.04 and 0.01, respectively (pp. B9 and B16).

NILU have also presented data on POPs in *air* (EMEP/CCC-Report 8/96). In Appendix D (p. D1), annual average concentrations (pg/m^3) of POPs in air at Stórhöfði are compared to those at the two Norwegian

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[10] Westerland, Ulborg and Lista, respectively.

[11] Technical-grade HCH consists of 65-70% α-HCH, 14-15% γ-HCH, 7-10% β-HCH and 5-14% other isomers and compounds (WHO 1991, Environmental Health Criteria 124).

[12] According to information from the Environmental and Food Agency of Iceland and from the Chief Veterinary Officer in Iceland.

EMEP stations of Spitzbergen (Zeppelinfjell, at 78°N) in 1993 - 1995 and Lista (at 58°N, same as for precipitation above) in 1992 - 1995.

Both α-HCH and γ-HCH concentrations are much lower at Stórhöfði than Lista. The Spitzbergen values are devious: the α-HCH concentration is rather high as at Lista but the γ-HCH concentration is rather low as at Stórhöfði. The resulting γ-HCH/α-HCH ratios are lowest at Spitzbergen but almost as high at Stórhöfði as at Lista (see below). The concentration of HCB is somewhat lower at Spitzbergen than Lista but at Stórhöfði it is, as in precipitation, lower by one order of magnitude.

Concentrations of the DDTs (not analysed at Lista) are fairly similar at Stórhöfði and Spitzbergen with one exception (p,p'-DDT high at Stórhöfði in 1996). The chlordanes concentrations are in general highest at Lista, while at the other two stations they are similar with one exception (trans-CD is higher at Stórhöfði in 1995 than at both the other stations). Dieldrin is only analysed at Stórhöfði.

The lightest PCBs are not analysed at Lista and because of ambiguities it is hard to compare their concentrations at the other two stations; however, they seem to be somewhat lower at Stórhöfði than Spitzbergen. The heavier PCBs are of highest concentration in Lista (by one order of magnitude). At the other two stations their concentrations are similar; there is a slight increase in the concentrations of heavy PCBs at Stórhöfði from 1995 to 1996 (see 2.2.1) and the concentrations at Spitzbergen are close to those at Stórhöfði in 1995 for most substances.

In short, the concentrations of POPs in air at Stórhöfði are low and much closer to those at Spitzbergen than at the northwestern mainland of Europe with few exceptions only. Even further, for HCB and α-HCH much lower concentrations are measured in the air at Stórhöfði than at Spitzbergen[13]. However, a trend of lower γ-HCH/α-HCH ratio in precipitation at higher latitudes is roughly continued by that in air: For precipitation it is approximately 9 in Germany, 4 in southern Norway (Lista) and 0.6 at Stórhöfði (see above) and for air it is on average 1.2 at Lista, 0.7 at Stórhöfði and 0.2 at Spitzbergen (p. D1). It is interesting that at Stórhöfði this ratio is approximately the same for the two matrices whereas at Lista it is much higher for precipitation than air.

[13] If the HCB and α-HCH concentrations prove to be discordant with global measurements then the analytical processes must be looked into.

The AMAP (1997) report on the state of the Arctic environment includes a description of the levels of POPs in air, snow and rain. Graphs show the concentrations of HCHs in *air* (pg/m^3, page 78) at five Arctic stations[14] (1993 data) including Stórhöfði (1995 data only).

The ∑HCHs is lowest at Stórhöfði (in 1996 even lower). There, most values lie approximately in the range of 20 - 40 pg/m^3 but in the ranges of 25 - 75, 50 - 100 and 50 - 150 pg/m^3 at the other stations (spatially unsystematic). The γ-HCH/α-HCH ratio is highest in Stórhöfði; mostly due to low α-HCH concentration but partly due to substantial γ-HCH concentration. Since three of the four stations are farther up north than Stórhöfði the trend of lower γ-HCH/α-HCH ratio at higher latitudes is roughly confirmed.

According to a map of *pathways and source regions* for POP-contaminated air (page 79) elevated HCHs levels originate in Europe, western Russia and Siberia and reach e.g. Spitzbergen via east-curved pathways which omit Iceland. A plausible source for long-range transmission to Iceland is, on the other hand, the west coast of the United States and Canada which apparently is not considered to have elevated levels of HCHs.

As regards *precipitation*, some examples of measurements of HCH, DDT and PCB (7 components) are shown from a set of Russian Arctic stations[15] in 1994 (page 79). Comparing the Icelandic annual weighted mean concentration with that data (Appendix D, p.D2) the HCH at Stórhöfði is a little higher, the DDT is distinctly lower and PCB is a lot lower. In the report, *snow* is said to be very effective in scavenging particles from the atmosphere and one analysis of these substances in snow from Russia in 1995 is listed (hesitantly) with very high concentrations, 5 - 10 times higher than the Stórhöfði weighted mean. Admittedly, no distinction is made between rain and snow in the Icelandic samples; the average winter temperature is about 1.6 °C (Stórhöfði 1961 - 1990) and during each winter sampling period both snow and rain usually occur.

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[14] In order of increasing latitude from 60°N to 82°N: 1) Tagish, Yukon, Canada, 2) Stórhöfði, Heimaey island, Iceland, 3) Dunai, Lena River Delta, Russia, 4) Ny-Ålesund, Spitzbergen, Norway and 5) Alert, Ellesmere Island, Canada. The stations are dispersed over longitudes 12°E due west to 124°E. (In the report Stórhöfði station, located on Heimaey island in the Vestmannaeyjar archipelago off the south coast of Iceland, is referred to as Heimaey and marked, erroneously, off the north coast.)

[15] From about 65°N - 75°N: at Barents sea, Laptev sea (Siberia) and Taimyr peninsula (Siberia).

The *deposition of* HCH, DDT and PCB *to snow* (μg/m^2/season[16]) at seven stations in the Canadian Arctic[17] from 1991 to 1994 is also presented (page 79). In Appendix D (p. D2) that data is compared with winter deposition at Stórhöfði from October 1995 to May 1996 (μg/m^2/season). HCH and PCB depositions at Stórhöfði are similar to those in the Canadian Arctic but DDT deposition in Stórhöfði is two to ten times higher.

In short; *Icelandic data* is not very different from the limited Arctic data considered here but it holds a few surprises: The concentration of HCH in air is somewhat lower at Stórhöfði than at circumpolar stations while the concentration of HCH in precipitation is somewhat higher than at Russian stations (at least). Compared to Russian Arctic stations the concentration of DDT and PCB in precipitation is lower or much lower at Stórhöfði but compared to Canadian Arctic stations their deposition is similar or higher. These inconsistencies arise either because the Russian and Canadian data are not comparable or because the POPs situation is rather different in these two Arctic domains.

A thorough report on pollution measurements in *the sea around Iceland* (Magnús Jóhannesson et al., 1995) states that POPs concentration in the marine environment off Iceland is very low compared to other areas in the NE-Atlantic. The contents of PCBs (7 congeners), HCB and p,p'-DDE in fish sampled in 1991 and 1992 are comparable to the lowest measured in surrounding seas and two to six times lower than in fish from the southern stretches of the North Sea. Organic carbon in marine sediment sampled in 1990 contains very little PCB-153, much less than that of North Sea sediment.

Because persistent organic pollutants are almost exclusively of anthropogenic origin their presence is considered to confirm pollution even when their concentration in a natural environment is very low and it is concluded that a considerable part of what is measured in the sea around Iceland has come by long-range transmission from industrial regions in Europe and N-America.

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[16] Correct unit according to a draft from the author (D. Gregor), not mg/m^2/season as in the report.
[17] From 60°N to 82°N: Tagish, Whitehorse, Dawson City, Cape Dorset, Mould Bay, Eureka, Alert.

3. Írafoss and Reykjavík

Figs. 23a and 23b show the surroundings at the stations, the wet-only sampler at Írafoss and the bulk sampler at Reykjavík. The samples are analysed for heavy metals; **As** is apparently absent (pp. B18 - B27).

3.1 Heavy metals in precipitation sampled in 1992 - 1996

3.1.1 Description

Graphs for each element comparing *annual deposition*[6, page 6] at the two stations (figs. 24 - 29) show that it is usually much higher at Írafoss and that at Írafoss the values change more from one year to the next. Ignoring a few exceptionally high **Cd**-, **Ni**- and **Zn** values at Írafoss does not affect that general picture except for **Zn** which in 1993, 1995 and 1996 has higher annual deposition at Reykjavík than at Írafoss. Difference in *precipitation amount* must be taken into account when deposition at the two stations is compared; it was 814 mm/year at Reykjavík but 1861 mm/year at Írafoss on average during the period in question.

Graphs for each element comparing *annual weighted mean concentration*[7, page 6] (figs. 30 - 35) show less difference between the two stations than the graphs above. **Cu** values are comparable at the two stations even if they are usually somewhat higher at Írafoss; **Cr** and **Ni** values are just as often high at Reykjavík as at Írafoss; **Zn** values in 1993, 1995 and 1996 are now about six times higher in Reykjavík. For **Pb** and **Cd**, however, annual weighted mean concentration is always higher at Írafoss.

Figs. 36 - 41 show *monthly variation in deposition* for each element during the five year period at the two stations. Correlation between the two stations cannot be seen except possibly for **Cr**. Seasonal variations cannot be detected except possibly for **Ni** in Reykjavík which seems to have lower values during the winter months than the summer months. At Írafoss deposition of all elements is high or fairly high in December 1995, mainly because it rained a lot (372 mm compared to 204 mm on average in December). Slight interelement covariation can be detected between **Cd**, **Cu**, **Zn** and **Pb** at Írafoss and between **Cd**, **Cu** and **Zn** as well as between **Cr** and **Ni** at Reykjavík. When, at the same station,

deposition of two or more elements covariates, their concentration in precipitation either covariates or is fairly constant.

3.1.2 Discussion

Maximum annual weighted mean concentrations of heavy metals in precipitation (µg/l) are at Írafoss Cd 12.09, Cr 0.40, Cu 5.75, Ni 7.42, Pb 1.93 and Zn 469 whereas at Reykjavík they are Cd 0.03, Cr 0.35, Cu 2.92, Ni 0.96, Pb 0.70 and Zn 185 (Appendix B). Many of these values are *higher than would be expected* at such stations.

Maps produced by kriging[1, page 4] the results of measurements of Cd and Pb in precipitation *within the ECE region* in 1993 and 1994 (NILU: EMEP/CCC-Report 8/96, figs. 2 and 3) show zones of increasing annual weighted mean concentration towards central Europe. Some Stórhöfði ("Vestmannaeyjar") data is included and Iceland, together with the Norwegian west coast, represents the zone of lowest concentration (Pb < 1.0 µg/l and Cd < 0.04 µg/l). Considering the longer data series presented here, 1992 - 1996, this is always true for Reykjavík but not for Írafoss (figs. 30 - 35). Pb values from Írafoss belong to the lowest zone in 1993, 1994 and 1996 but to the 2nd lowest zone (1- 2 µg/l) in 1992 and 1995. More dramatically, Cd values from Írafoss belong to the 2nd zone in 1993, the 4th zone in 1992 and exceed the definition of the zone of highest concentration (Cd > 0.24 µg/l) in 1994, 1995 and 1996. This is all the more surprising for the fact that at Írafoss the sampling method is wet-only (p. A4), i.e. aerosol is excluded except when scavenged by rain or snow, while at Reykjavík the method is non-discriminating bulk sampling (p. A5), including the dry deposition of aerosol.

It seems evident that *filtering* of the Icelandic data is necessary. *Contamination* from the sampling equipment itself is possible; the opening mechanism of the wet-only sampler in Írafoss ought to be inspected and also, because of the high Zn concentration, the bird-ring on the bulk sampler in Reykjavík (p. A5). In a new field *intercomparison* of heavy metals in precipitation (Winkler and Roider, 1997) the use of averages of at least two duplicate collectors at the same site, harmonization of sampler shape and handling procedures and the calculation of deposition in periods of about 3 months (for weekly samples) is recommended to improve the determination of heavy metals in precipitation.

It is true that *the volcanic bedrock* in Iceland and the continental crust of Europe have different compositions, which should be reflected to some extent in the heavy metal content of precipitation and air. The effect would supposedly be similar in the two matrices even though air is sampled at a different location (Stórhöfði); incidentally Stórhöfði and Írafoss are located in the volcanic rift zone[18] while Reykjavík is on or just outside its western margin. According to a recent comparison Icelandic basalt has higher Cr (x 4), Cu (x 2.5) and Ni (x 2) content whereas the continental crust has higher Pb (x 4) and Cd (x 2) content (Kristján Geirsson, 1994). Nevertheless, high Cd content in cod liver and high Cd, Cu and Zn content in mussel from the Icelandic *fishing grounds* is considered to stem from natural causes such as volcanic activity, erosion and vertical mixing of seawater (Magnús Jóhannesson et al., 1995).

Mosses, which obtain most of their supply of chemical substances directly from precipitation and airborne particulates, can shed light on atmospheric deposition. Rühling et al. (1992) have shown that the concentrations of most heavy metals follow a certain pattern in Iceland; they are highest in moss growing in the zone of high soil erosion[18] but decrease away from it. The concentrations of Cd, Cr, Cu and Ni are rather high in Iceland, those of Fe and V are extremely high, but the concentration of Zn is low with a fainter pattern. The concentration of As is low but slightly higher near Reykjavík. Pb concentration is much lower than in any other country in northern Europe with two local maxima: one around Reykjavík, associated with denser population, and the other in the south east, associated with higher precipitation levels (Rühling et al., 1992) or long-range transmission (Rühling et al., 1996).

In the AMAP (1997) report on the state of the Arctic environment, contrasting levels of heavy metals deposition in the Arctic are illustrated. *Ice cores from Greenland* reveal (page 100) how annual deposition to the icecap increased from 1850 to 1970, that of Cd from 6 to 40 and Pb from 3 to 25 $\mu g/m^2$ (approximate values), but decreased thereafter: Cd to 18 and Pb to 4 $\mu g/m^2$ in 1992. At Reykjavík in 1992 the deposition of Cd (25 $\mu g/m^2$) is only somewhat higher than such deposition to the Greenland icecap but the deposition of Pb (517 $\mu g/m^2$) is about one hundred times higher, presumably from car exhaust. Írafoss values in 1992 are too high to be trustworthy (Cd 323, Pb 3981 $\mu g/m^2$)[19].

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[18] A zone of young rocks and high volcanic activity, crossing the country from south west to north east.
[19] For all cited values in this section see Appendix B: even numbered pages (B18 - B26) for concentrations, odd numbered pages (B19 - B27) for depositions.

In sharp contrast to Greenland, the yearly deposition of Ni and Cu can reach a few hundred mg/m^2 (not µg/m^2) close to *the smelters on the Kola Peninsula* (AMAP, 1997, p. 101). The levels fall rapidly to a few mg/m^2 within a few tens of kilometers, which is the value representative for northern Finland but still three or four orders of magnitude higher than the 1992 ice core values for Pb and Cd.

As discussed earlier, the deposition of heavy metals *in Iceland* is not easily estimated from the five years dataset presented here. The annual deposition of Cd at Reykjavík ranges from 9 to 25 µg/m^2, comparable to the 1992 ice core value, whereas at Írafoss it measures at least 119 µg/m^2. Pb annual deposition at Reykjavík ranges from 0 (delusive[20]) to 517 µg/m^2, far from the ice core value of about 4, and at Írafoss it measures at least 691 µg/m^2. For the other two metals presented in the Arctic report, Cu annual deposition at Reykjavík ranges from 1.4 to 2.0 mg/m^2 whereas at Írafoss it measures at least 2.8 mg/m^2. Ni annual deposition at Reykjavík is in the range of 0.2 to 0.6 mg/m^2 whereas at Írafoss it measures 0.15 mg/m^2 in 1992 but at least 0.6 mg/m^2 after that. *In short*, taking only minimum values at Írafoss into account the Cu deposition is similar or somewhat lower in Iceland than in northern Finland while the Ni deposition is lower by one order of magnitude.

European atmospheric emission of Zn (AMAP, 1997, p. 98) is shown to be lower than that of Pb but yet of the same order of magnitude and following a similar trend. Apart form that, neither Zn nor Cr are studied in the Arctic report.

4. Summary

Heavy metals in air at Stórhöfði are mostly of low concentration. Compared to winter air in the Arctic and to a low-reference station in south Norway their concentrations are: Pb very low, Cd low, As low or moderate, Cu moderate, Zn and Ni somewhat high. In more than half of the short series available there is good continuous correlation between Cr and Ni and between Zn and Cu.

[20] The concentration of Pb in precipitation is close to the detection limit; therefore, the effect of a slight decrease in Pb concentration (taking it below detection limit) is an apparent zero deposition. Incessant car traffic has been the source of Pb and zero deposition at Reykjavík (Fig. 28) in 1993 is probably delusive, although in 1996 the oil companies decided unanimously not to import leaded petrol.

Persistent organic pollutants are mostly of low concentration; values are in general more stable in 1996. Annual averages of HCHs, HCB and lighter PCBs are slightly lower in 1996 than 1995 while of the heavier PCBs they are slightly higher. DDTs are almost absent from both precipitation and air during the later half of 1995; in both there is a shift from p,p'-DDD to p,p'-DDT as the dominating substance. PCBs and HCB are present in almost every sample; the concentration of HCB is relatively much higher in air than in precipitation. Dieldrin occurs randomly in 1995 but is stable in 1996. HCHs are present in almost every sample; the γ-HCH/α-HCH ratio (of averages) is about 0.6 in precipitation and 0.7 in air; lindane (γ-HCH) peaks at the same time in both matrices. Chlordanes occur erratically in precipitation but they are unavoidable in air.

Compared with precipitation data from three European stations (latitudes 55 - 58 °N) the ∑HCHs is of much lower concentration at Stórhöfði with a much lower γ-HCH/α-HCH ratio. The ratio confirms a trend set by European data: lower at higher latitudes, also confirmed by Arctic stations. On the other hand, HCB in precipitation at Stórhöfði measures much lower than the supposedly uniform global concentration reflected by the European stations. The same is true for POPs in air.

Comparison with data from Arctic stations is a little perplexing; however, the POPs situation at Stórhöfði is more like in the Arctic than at the stations on the mainland of Europe.

Heavy metals in precipitation are, when results seem reliable, of fairly low concentration. For instance, the annual weighted mean concentration of Cd and Pb at Reykjavík is always comparable to the lowest in Europe and that of Pb at Írafoss mostly as well. But extreme values[21] occur often enough to raise doubts about the validity of the data set and the concentration of Zn at Reykjavík is consistently high.

Compared to the Greenland icecap, Reykjavík has similar Cd deposition but much higher Pb deposition and compared to northern Finland, Reykjavík has similar Cu deposition but lower Ni deposition. At Írafoss the deposition of Cd, Pb, Cu and Ni measures much higher.

Annual deposition is more uniform at Reykjavík than Írafoss, especially for Cd, Cu and Zn. It rains far less at Reykjavík and the annual

[21] Verified by repeated analyses.

deposition is of course higher at Írafoss with few exceptions[22]. Annual weighted mean concentration is similar at the two stations for Cr, Cu and Ni, often much higher at Reykjavík for Zn but always higher at Írafoss for Cd and Pb. Distinct trends or correlations can neither be found in the annual weighted mean concentrations nor in the deposition variation diagrams.

Anomalously high concentration values occur at *Írafoss* in January 1996, in December, November, July and April 1995, in July, May and April 1994 and in December and February 1992. Also more moderately at *Reykjavík* in June 1995, August 1994 and February 1992.

Such values are tagged in the tables of results in Appendix B and listed in two separate tables at the end (pp. B28 and B29). They occur in thirteen out of 119 samples and seven of these have high concentrations of more than one element. No such values occur in 1993, neither at Írafoss nor Reykjavík. The concentrations of As, which is probably absent, and Cr are never anomalously high.

5. Conclusions

The data on *heavy metals in air* looks promising but a longer series, a part of which is expected soon, is imperative.

The data on *persistent organic pollutants* seems reliable with some interesting deviations from the global picture. Extensive comparison with data emerging from elsewhere, especially northern latitudes, is obviously necessary. It would be interesting to get at least one sample that is strictly snow (not mixed snow and rain) because of its greater capacity of scavenging particles from air.

The data on *heavy metals in precipitation* needs to be filtered. Rules such as exclusion of values more than three (or two?) standard deviations from the mean value could be applied but preferably coupled with sound arguments in each case[23]. Perhaps all data in February 1992 should be discarded as a pilot experiment. After filtering a literature survey ought to be conducted, looking for similar values and possibly similar

[22] Higher at Reykjavík: Ni in 1992 and Zn in 1993, 1995 and 1996.

[23] There are no easy answers for Írafoss, e.g. in 1995: Contamination during dismantling of equipment for repair may be the source of high Ni values in November and reinstallation may be the source of high Cd and Pb values in December, but high Ni content in July remains unexplained.

problems. Perhaps it is best, from now on, to do bulk sampling at Írafoss instead of wet-only sampling. The bird-ring at Reykjavík station will probably be removed; first, though, droplets of precipitation cohesive to the rods will be tested for heavy metal contamination.

Application of statistics to detect significant correlation in the dataset, both internally and with outside parameters would perhaps improve the interpretation of results.

In order to cut costs the number of samples could be reduced by short selective sampling, preferably according to wind direction. However, it has been pointed out (Flosi Hrafn Sigurðsson, personal communication) that local wind direction is an uncertain indication of trajectories and that air pumps would have to be far more effective to extract enough, in a shorter sampling period, to exceed detection limits. Point sampling on short notice is also demanding for staff at the stations. The coordination reached already between staff at (or traveling to) the sampling stations, the chemists at the two laboratories and staff at the Meteorological Office is of great value and therefore it is recommended that *acquisition of data in the same fashion as now be continued*, with improved sampling of precipitation for the analysis of heavy metals.

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[24] at Veðurstofa Íslands (Icelandic Meteorological Office).

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Appendix A

Descriptions of stations, sampling procedures and analytical methods

STÓRHÖFÐI

Responsible national institute: Icelandic Meteorological Office.
Location and surroundings: At the southern tip of the island Heimaey, which is the largest of the Vestmannaeyjar islands 12 km off the south coast of Iceland. The latitude is 63° 24' N and the longitude is 20° 17' W. The elevation above sea level is 118 m. Distance from the fishing town on the island (4500 inhabitants) is 4.5 km; distance to the nearest village (700 inhabitants) on shore is 40 km; distance to the nearest town (4000 inhabitants) on shore is 70 km.

SAMPLING PROCEDURE FOR HEAVY METALS IN AIR:
Project status: First year: 1995. Samples from 1996 have not yet been analysed.
Air is pulled through a quartz filter sampling aerosol and air simultaneously. Refrigeration until analysis is not considered necessary. The sampling period is about 15 days and the quantity of air ranges from 16000 to 20600 m^3 per period in 1995 (17700 m^3 on average). The active area of the filter is 422 cm^2 and two 60 cm^2 strips are cut from its center for analysis - one for the heavy metals (cations) and one for anions studied simultaneously. Concentration in air is calculated assuming equal distribution of analysed substances across the filter.
Analytical methods: The cation-strip is dissolved in a small amount of acid subsequently diluted to a volume of 200 ml. The anion-strip is washed in 100 ml of a carbonate-bicarbonate solution. The solutions are analysed using the methods below, field- and lab-blanks are run and recovery is checked using prepared standards. There are no Hg-results in 1995 because of high Hg-content in the blanks; if results for Hg will be obtained later on the relevant description will be included. For other elements:
Measurements:
As, Se: atomic absorption spectrophotometry by hydride generation
Cr, Cu, Pb, Ni, Zn, Cd, Al: atomic absorption spectrophotometry in a graphite furnace
Cl, SO_4, NO_3: ion chromatography
Detection limits for the analysed solutions:
As, Cr, Cu, Pb, Zn: 0.1 ppb
Se: 4 ppb (in 1995 all Se analyses were below detection limit)
Ni: 0.5 ppb
Cd: 0.05 ppb
Al: 1 ppb
Cl, NO_3: 25 ppb
SO_4: 20 ppb
Corresponding minimum concentrations in air using average air quantity per period:
As, Cr, Cu, Pb, Zn: 0.008 ng/m^3
Se: 0.3 ng/m^3
Ni: 0.04 ng/m^3
Al: 0.1 ng/m^3
Cd: 0.004 ng/m^3
Cl, NO_3: 1 ng/m^3
SO_4: 0.8 ng/m^3
Quality assurance: Our subcontractor is the National Energy Authority. They participated in the HELCOM-EMEP-PARCOM-AMAP Analytical Intercomparison of Heavy Metals in precipitation, 1994, reporting to the Chemical Co-ordinating Centre at the Norwegian Institute of Air Reasearch. The results were satisfactory with the possible exception of those for arsenic (too low).

STÓRHÖFÐI

Responsible national institute: Icelandic Meteorological Office.
Location and surroundings: At the southern tip of the island Heimaey, which is the largest of the Vestmannaeyjar islands 12 km off the south coast of Iceland. The latitude is 63° 24' N and the longitude is 20° 17' W. The elevation above sea level is 118 m. Distance from the fishing town on the island (4500 inhabitants) is 4.5 km; distance to the nearest village (700 inhabitants) on shore is 40 km; distance to the nearest town (4000 inhabitants) on shore is 70 km.

SAMPLING PROCEDURE FOR PERSISTENT ORGANIC POLLUTANTS:

Project status: Pilot-run for 2 months in 1994. First year 1995; 1996 being analysed.
Precipitation (bulk) is collected in an open device, a steel funnel of 1 m^2 wide opening. The rainwater seeps through polyurethane foam which extracts the POPs for successive periods of about 15 days. (Concentration is calculated using a quantity measurement of the precipitation that seeps through the foam. Deposition can *either* be calculated using this concentration and information on the amount of precipitation from the local weather station *or* the contents of the foam can, because of the dimensions of the sampling device, be regarded directly as deposition. Deposition by the first method is preferable as the quantity of precipitation in the sampling device is consistently lower than the quantity measured with the standard precipitation gauge.)
The cleansing sample, when reported, is analysis of pure cotton wool (field-blank corrected) used to wipe the precipitation sampling equipment. This is done twice a year. In 1995 the contents of the cotton wool were surprisingly high.
Air is sampled by pulling air through polyurethane foam which extracts the POPs for successive periods of about 15 days. The quantity of air is calculated from the air flow and amounts to about 1000 m^3 per period. No separation of aerosol from air is attempted, hence the results give the sum of concentration in air and in aerosol.
Field- and lab-blanks are analysed and the sample results are blank corrected.
Detection limits are for 1995 as follows (for 1996 lower for most compounds):
HCHs: 0.5 - 0.6 ng
HCB: 0.1 - 0.2 ng
DDE: 0.5 - 0.7 ng
DDD: 0.8 - 1.3 ng
DDT: 1.0 - 1.5 ng
PCBs: 0.2 - 0.3 ng
Dieldrin: 2 - 4 ng (see footnote 1, next page)
Chlordanes: 0.4 - 0.5 ng
Corresponding minimum concentrations in air using average air quantity per period:
HCHs: 0.5 - 0.6 pg/m^3 = 0.00055 ng/m^3
HCB: 0.1 - 0.2 pg/m^3 = 0.00015 ng/m^3
DDE: 0.5 - 0.7 pg/m^3 = 0.00060 ng/m^3
DDD: 0.8 - 1.3 pg/m^3 = 0.00105 ng/m^3
DDT: 1.0 - 1.5 pg/m^3 = 0.00125 ng/m^3
PCBs: 0.2 - 0.3 pg/m^3 = 0.00025 ng/m^3
Dieldrin: 2 - 4 pg/m^3 = 0.00300 ng/m^3
Chlordanes: 0.4 - 0.5 pg/m^3 = 0.00045 ng/m^3
Analytical methods and quality assurance as described by our subcontractor, the Department of Pharmacology, University of Iceland (January 1997):

Analysis of organochlorines in air and precipitation:
Cleaning of sampling apparatus. Samples are collected on polyurethane foam plugs, 27 x 40 mm, that sit in a 50 ml syringe, 2 plugs in each (Åkesson and Örbo, Mönsterås, Sweden). The syringe used to collect air is further fitted with a stainless steel ring at the bottom to keep the foam plugs from being drawn into the tips. Before assembly the syringe is rinsed with acetone *p.a.* and the foam plugs and stainless steel rings are cleaned in soxhlet for 24 hrs with hexane 95% (Rathburn) and for 24 hrs in acetone *p.a.* (Merck).
Storage of samples. The syringes were stored in a closed plastic container when not in use. The containers were frozen immediately after sample collection.
Extraction. The foam plugs were put in the soxhlet apparatus and the syringes were rinsed with the extraction solvent (200 ml n-hexane (95%) / acetone *p.a.* (1:1) for 12-14 hrs). Recovery standards (10 ng ε-HCH, 9.5 ng PCB-112, 11 ng o,p'-DDD and 5.7 ng PCB-198) were added directly into the foam plugs. After the extraction the organic phase was washed with 50 ml 0.9% NaCl / 0.1 M H_3PO_4. The water phase was finally washed with 10 ml n-hexane 95%. The combined organic phases were evaporated to 100-200 µl in a waterbath at 60°C. The sample was finally dissolved in 2 ml of isooctane with an injection standard (tetrachloronaphthalene) added.
Clean-up. About half of the sample (0.9-1 ml) was treated with 5-6 ml of sulfuric acid 95-97% *p.a.* and then evaporated to 100 µl for injection into the gas chromatograph. The remaining sample (0.9-1 ml) was cleaned with KOH in ethanol at 50 °C and evaporated to 100 µl for injection into the gas chromatograph (for the analysis of the drins[1]).
Analysis. HP5890 Series II gas chromatograph with ECD. Columns: DB5, 60 m, 0.25 mm i.d., 0.25 µm film and DB1701, 60 m, 0.25 mm i.d., 0.25 µm film. Carrier gas: Helium. Inlet: 270°C, ECD: 310°C. Temperature program: DB5: 85°C for 2 min, 30°C/min to 210°C, 210°C for 28 min, 2°C/min to 250 °C, 7°C/min to 310°C, 310°C for 7 minutes. DB1701: 85°C for 2 min, 30°C/min to 210°C, 210°C for 22 min, 2°C/min to 260 °C, 7°C/min to 290°C, 290°C for 8 minutes.
Standards. Standards were bought as neat crystals or certified solutions from Promochem, Germany and Accustandard, USA. Standard solutions were made up in isooctane in the range of 10-500 pg/µl that contained:

10 PCB (28, 31, 52, 101, 105, 118, 138, 153, 156 and 180)
α-, β- and γ-HCH
HCB,
cis- and trans-chlordane[2] and trans-nonachlor,
dieldrin, aldrin, isodrin and endrin
2,4'-DDE, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT and 4,4'-DDT[3],
ε-HCH, 2,4'-DDD, PCB-112 and PCB-198 (recovery standards)
TCN (tetrachloronaphthalene, injection standard).

Quality assurance. The laboratory has participated in 4 steps of the ICES/IOC/OSPARCOM intercomparison program on the analysis of chlorobiphenyls in marine media (1991-1994) and 2 steps of IUPAC project 650/80/94 on the determination of toxicologically relevant chlorobiphenyls in two fish oils and an analyte solution in 1995 and 1996.

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[1] Because dieldrin, aldrin, isodrin and endrin disappear in sulfuric acid half the sample is cleaned less efficiently with KOH in ethanol and reserved for analysis of the "drins". Consequently the detection limit for the "drins" is higher (see previous page).
[2] Also called α- and γ-chlordane. An abbreviation for chlordane is CD and and abbreviation for nonachlore is NO but the term "chlordanes" comprises both.
[3] The DDT derivatives can either be referred to as 2,4'- and 4,4'- or o,p'- and p,p'-DDTs.

ÍRAFOSS

Responsible national institute: Icelandic Meteorological Office.

Location and surroundings: Situated at a hydropower station in south Iceland. The surroundings are mostly pasture and heath land with a small area of farmland and a lake close to the site. Latitude 64° 05' N, longitude 21° 01' W, elevation 65 m above sea level, distance from the sea 26 km, distance form urban centres: about 15 km to towns of about 1000 inhabitants.

SAMPLING PROCEDURE for HEAVY METALS IN PRECIPITATION:

Project status: Began in January 1992. Samples 1992 - 1996 have all been analysed.

Sampling technique:
Monthly sampling, approximately (exact dates are recorded). Wet only samples are collected in a MISU automatic sampler. The funnel is 314 cm^2 and is heated. The sampling bottle and funnel are made of polypropylene. The hight of the sampler is 1.5 m above ground. The sample is refrigerated until it is analysed.

Parameters:
pH, conductivity, Na, K, Mg, NO_3, SO_4, Ca, Cl, as well as the heavy metals Cr, Cu, Zn, As, Cd, Ni, Pb. Information on precipitation quantity is acquired through daily measurements in a standard WMO gauge at the station.

Analytical methods:
pH: measured by a pH-meter with a glass electrode
Conductivity: measured with a conductivity meter
In a filtered sample:
Cl, SO_4, NO_3: measured by ion chromatography
In a filtered and acidified sample:
Na, K: measured by atomic emission spectrophotometry
As: atomic absorption spectrophotometry by hydride generation
Ca, Mg, Cr, Cu, Pb, Ni, Zn, Cd: measured by atomic absorption spectrophotometry in a graphite furnace

Detection limits:
Mg, As, Cr, Cu, Zn: 0.1 ppb
Ni, Pb: 0.5 ppb
Cd: 0.05 ppb
Cl, NO_3: 20 - 25 ppb
SO_4: 20 ppb
Na, K, Ca: 1 ppb

Quality assurance: Our subcontractor is the National Energy Authority. They participated in the HELCOM-EMEP-PARCOM-AMAP Analytical Intercomparison of Heavy Metals in precipitation, 1994, reporting to the Chemical Co-ordinating Centre at the Norwegian Institute of Air Reasearch. The results were satisfactory with the possible exception of those for arsenic (too low).

REYKJAVÍK

Responsible national institute: Icelandic Meteorological Office.
Location and surroundings: A synoptic weather station in the capital of Iceland, Reykjavík, which including the adjacent villages is a town of about 150,000 inhabitants. It is situated on a small peninsula and the nearby coastal areas. There is considerable car traffic, little agricultural activity, some fish-processing and one fertiliser factory within a 10 km radius. Typical winds are easterly, typical windspeed is 5 m/sec measured 10 m above ground. Latitude 64° 08' N, longitude 21°54' W, elevation 52 m above sea level, distance from the sea 0.5 km.

SAMPLING PROCEDURE for HEAVY METALS IN PRECIPITATION:

Project status: Began in February 1992. Samples 1992 - 1996 have all been analysed.

Sampling technique: Bulk sampling, approximately monthly (exact dates are recorded). A cabin, 1.5 m above ground, contains a glass funnel connected to a winter-heated polyethylene bottle. The vertical wall of the funnel (diameter 16.0 cm) protrudes 8 cm above the cabin-roof. Around the wall there is a "bird-ring" of 12 cm tall metal rods. The sample is refrigerated until it is analysed.

Parameters:
pH, conductivity, Na, K, Mg, NO_3, SO_4, Ca, Cl, as well as the heavy metals Cr, Cu, Zn, As, Cd, Ni, Pb. Information on precipitation quantity is acquired through daily measurements in a standard WMO gauge at the station.

Analytical methods:
pH: measured by a pH-meter with a glass electrode
conductivity: measured with a conductivity meter
In a filtered sample:
Cl, SO_4, NO_3: measured by ion chromatography
In a filtered and acidified sample:
Na, K: measured by atomic emission spectrophotometry
As: atomic absorption spectrophotometry by hydride generation
Ca, Mg, Cr, Cu, Pb, Ni, Zn, Cd: measured by atomic absorption spectrophotometry in a graphite furnace

Detection limits:
Mg, As, Cr, Cu, Zn: 0.1 ppb
Ni, Pb: 0.5 ppb
Cd: 0.05 ppb
Cl, NO_3: 20 - 25 ppb
SO_4: 20 ppb
Na, K, Ca: 1 ppb

Quality assurance: Our subcontractor is the National Energy Authority. They participated in the HELCOM-EMEP-PARCOM-AMAP Analytical Intercomparison of Heavy Metals in precipitation, 1994, reporting to the Chemical Co-ordinating Centre at the Norwegian Institute of Air Reasearch. The results were satisfactory with the possible exception of those for arsenic (too low).

Appendix B

Tables with results of measurements and a list of tables

List of tables

page

Data from Stórhöfði 1995:

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Heavy metals in air - Contents B2
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Data from Stórhöfði 1995:

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Persistent organic pollutants - Air - POPs contents B5
Persistent organic pollutants - Air - POPs concentrations B6
Persistent organic pollutants - Precipitation quantity B7
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Data from Írafoss and Reykjavík:

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Heavy metals in air

Stórhöfði 1995 - Air quantity per period

period	FROM:		TO:		length	air flow			air quantity (m3)	
no.	date	hour	date	hour	(days)	" d H2O	**	m3/min	in period	on average
1	11/01/1995	17:00	19/01/1995	00:00	7.29	1.8	=	0.85	8820	
2	19/01/1995	00:00	26/01/1995	12:00	7.50	1.8	=	0.85	9075	in
3	26/01/1995	12:00	02/02/1995	17:00	7.21	1.8	=	0.85	8720	shorter
4	02/02/1995	17:00	09/02/1995	17:00	7.00	1.8	=	0.85	8518	periods:
5	09/02/1995	17:00	16/02/1995	11:00	6.75	1.8	=	0.85	8165	
6	16/02/1995	11:00	23/02/1995	16:00	7.21	1.8	=	0.85	8771	8662
7	23/02/1995	16:00	03/03/1995	15:00	7.96	1.9	=	0.86	8567	
8	03/03/1995	15:00	18/03/1995	12:00	14.88	1.8	=	0.85	18100	
9	18/03/1995	12:00	03/04/1995	15:00	16.13	1.9	=	0.86	16824	
10 *	03/04/1995	15:00	25/04/1995	12:00	21.88					
11	25/04/1995	12:00	10/05/1995	12:00	15.00	1.3	=	0.78	16310	
12	10/05/1995	12:00	25/05/1995	12:00	15.00	1.3	=	0.78	16848	
13	25/05/1995	12:00	12/06/1995	14:00	18.08	1.4	=	0.80	20572	in
14	12/06/1995	14:00	30/06/1995	18:00	18.17	1.3	=	0.78	20405	longer
15	30/06/1995	18:00	15/07/1995	19:00	15.04	1.3	=	0.78	16678	periods:
16	15/07/1995	19:00	31/07/1995	22:00	16.13	1.2	=	0.76	17647	
17	31/07/1995	22:00	15/08/1995	19:00	14.88	1.3	=	0.78	16493	17707
18	15/08/1995	19:00	31/08/1995	19:00	16.00	1.1	=	0.74	17050	
19	31/08/1995	19:00	15/09/1995	18:00	14.96	1.2	=	0.76	16370	
20	15/09/1995	18:00	01/10/1995	16:30	15.94	1.2	=	0.76	17419	
21	01/10/1995	16:30	16/10/1995	11:00	14.77	1.2	=	0.76	16142	
22 *	16/10/1995	11:00	27/10/1995	18:00	11.29					
23	27/10/1995	18:00	15/11/1995	13:00	18.79	1.2	=	0.76	20566	
24	15/11/1995	13:00	02/12/1995	09:00	16.83	1.2	=	0.76	18180	

* Air pump out of order.
** According to calibration.

Heavy metals in air - Stórhöfði 1995 - Contents

	period no.	Cd ng	Cu ug	Pb ug	Zn ug	Cr ug	Ni ug	Al ug	As ng	Se ng
Contents measured in filter strips (18.2 X 3.3 cm)	1	62	3.40	0.74	9.0	6.71	4.62	163	29	117
	2	40	0.20	1.65	3.8	0.29	0.82	115	49	85
	3	28	1.82	0.58	3.8	1.33	1.28	394	61	133
	4	53	0.84	1.64	6.2	0.11	0.82	158	73	115
	5	38	1.20	1.16	4.0	0.31	2.44	178	103	113
	6	22	1.28	0.72	3.0	0.29	4.42	290	95	35
	7	72	2.54	1.62	3.8	8.25	5.78	159	67	59
	8	140	2.16	3.02	16.0	5.03	8.12	504	267	107
	9	347	2.48	2.70	31.0	12.7	9.32	270	183	243
	11	295	2.18	1.27	19.0	0.75	2.22	648	85	161
	12	87	3.58	3.58	20.0	5.85	10.9	828	155	259
	13	76	3.08	3.93	18.6	1.08	8.10	287	999	581
	14	83	3.46	3.87	20.4	41	25.3	280	1055	713
	15	103	5.46	3.35	24.0	4.31	1.74	2203	557	325
	16	48	5.10	1.28	15.6	13.6	10.2	1503	935	259
	17	56	5.94	1.86	19.7	6.0	2.94	146	1027	427
	18	36	1.68	0.59	6.8	16.1	14.0	314	1182	163
	19	68	2.32	2.36	11.2	1.07	0.52	170	1195	211
	20	48	2.14	1.86	6.2	16.9	11.5	213	1310	59
	21	27	2.88	1.61	10.0	2.17	0.86	512	1435	139
	23	69	8.46	4.17	33.8	4.77	2.12	2007	1443	293
	24	91	7.50	3.81	22.6	21.3	14.4	5203	383	335
maximum in strip:		347	8.46	4.17	33.8	41	25.3	5203	1443	713
minimum in strip:		22	0.20	0.58	3.0	0.11	0.52	115	29	35
concentration unit:		ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb
maximum as in analysed solution:		1.74	0.0423	0.0209	0.1690	0.2050	0.1265	26.015	7.2	3.6
minimum as in analysed solution:		0.11	0.0010	0.0029	0.0150	0.0006	0.0026	0.575	0.15	0.2
detection limit in analysed solution:		0.05	0.0001	0.0001	0.0001	0.0001	0.0005	0.001	0.1	4
conclusion:		All Se results must be rejected. One As result is near detection limit.								
alternative method (quantity):		ng	ug	ug	ug	ug	ug	ug	ng	ng
detection limit in strip:		10	0.02	0.02	0.02	0.02	0.10	0.2	20	800

Contents calculated in filters (18.2 X 23.2 cm)	1	436	23.90	5.20	63.3	47.17	32.48	1146	204	823
	2	281	1.41	11.60	26.7	2.04	5.76	808	344	598
	3	197	12.80	4.08	26.7	9.35	9.00	2770	429	935
	4	373	5.91	11.53	43.6	0.77	5.76	1111	513	808
	5	267	8.44	8.16	28.1	2.18	17.15	1251	724	794
	6	155	9.00	5.06	21.1	2.04	31.07	2039	668	246
	7	506	17.86	11.39	26.7	58.00	40.64	1118	471	415
	8	984	15.19	21.23	112.5	35.36	57.09	3543	1877	752
	9	2440	17.44	18.98	217.9	89.28	65.52	1898	1287	1708
	11	2074	15.33	8.93	133.6	5.27	15.61	4556	598	1132
	12	612	25.17	25.17	140.6	41.13	76.63	5821	1090	1821
	13	534	21.65	27.63	130.8	7.59	56.95	2018	7023	4085
	14	584	24.32	27.21	143.4	288.24	177.87	1968	7417	5013
	15	724	38.39	23.55	168.7	30.30	12.23	15488	3916	2285
	16	337	35.85	9.00	109.7	95.61	71.71	10567	6573	1821
	17	394	41.76	13.08	138.5	42.18	20.67	1026	7220	3002
	18	253	11.81	4.15	47.8	113.19	98.42	2208	8310	1146
	19	478	16.31	16.59	78.7	7.52	3.66	1195	8401	1483
	20	337	15.04	13.08	43.6	118.81	80.85	1497	9210	415
	21	190	20.25	11.32	70.3	15.26	6.05	3600	10088	977
	23	485	59.48	29.32	237.6	33.53	14.90	14110	10145	2060
	24	640	52.73	26.79	158.9	149.75	101.24	36579	2693	2355
detection limit in filter:		70	0	0	0	0	1	1	141	5624

Heavy metals in air - Stórhöfði 1995 - Concentrations

	period no.	Cd ng/m3	Cu ng/m3	Pb ng/m3	Zn ng/m3	Cr ng/m3	Ni ng/m3	Al µg/m3	As ng/m3	Se ng/m3
	1	0.0494	2.7101	0.5898	7.1738	5.3485	3.6825	0.1299	0.0231	0.0933
	2	0.0310	0.1549	1.2782	2.9437	0.2247	0.6352	0.0891	0.0380	0.0658
	3	0.0226	1.4673	0.4676	3.0635	1.0722	1.0319	0.3176	0.0492	0.1072
	4	0.0437	0.6933	1.3536	5.1174	0.0908	0.6768	0.1304	0.0603	0.0949
	5	0.0327	1.0333	0.9988	3.4442	0.2669	2.1010	0.1533	0.0887	0.0973
	6	0.0176	1.0260	0.5771	2.4046	0.2324	3.5428	0.2324	0.0761	0.0281
	7	0.0591	2.0844	1.3294	3.1183	6.7701	4.7432	0.1305	0.0550	0.0484
	8	0.0544	0.8390	1.1730	6.2147	1.9537	3.1539	0.1958	0.1037	0.0416
	9	0.1450	1.0363	1.1282	12.9538	5.3069	3.8945	0.1128	0.0765	0.1015
(out of order)	10									
	11	0.1272	0.9396	0.5474	8.1896	0.3233	0.9569	0.2793	0.0366	0.0694
	12	0.0363	1.4939	1.4939	8.3456	2.4411	4.5483	0.3455	0.0647	0.1081
	13	0.0260	1.0526	1.3431	6.3565	0.3691	2.7682	0.0981	0.3414	0.1986
	14	0.0286	1.1921	1.3334	7.0286	14.1262	8.7169	0.0965	0.3635	0.2457
	15	0.0434	2.3015	1.4121	10.1166	1.8168	0.7335	0.9286	0.2348	0.1370
	16	0.0191	2.0317	0.5099	6.2147	5.4180	4.0635	0.5988	0.3725	0.1032
	17	0.0239	2.5319	0.7928	8.3971	2.5575	1.2532	0.0622	0.4378	0.1820
	18	0.0148	0.6927	0.2433	2.8039	6.6387	5.7728	0.1295	0.4874	0.0672
	19	0.0292	0.9963	1.0135	4.8099	0.4595	0.2233	0.0730	0.5132	0.0906
	20	0.0194	0.8637	0.7507	2.5023	6.8208	4.6413	0.0860	0.5287	0.0238
	21	0.0118	1.2543	0.7012	4.3552	0.9451	0.3745	0.2230	0.6250	0.0605
(out of order)	22									
	23	0.0236	2.8920	1.4255	11.5545	1.6306	0.7247	0.6861	0.4933	0.1002
	24	0.0352	2.9003	1.4733	8.7395	8.2368	5.5686	2.0120	0.1481	0.1295
minimum value:		0.0118	0.1549	0.2433	2.4046	0.0908	0.2233	0.0622	0.0231	0.0238
maximum value:		0.1450	2.9003	1.4939	12.9538	14.1262	8.7169	2.0120	0.6250	0.2457
detection limit during short periods:		0.0081	0.0162	0.0162	0.0162	0.0162	0.0812	0.0002	0.0162	0.6493
detection limit during long periods:		0.0040	0.0079	0.0079	0.0079	0.0079	0.0397	0.0001	0.0079	0.3176

Reliability: All Se results are below detection limit. No other results are below detection limit.

Monthly average concentrations:

	Cd ng/m3	Cu ng/m3	Pb ng/m3	Zn ng/m3	Cr ng/m3	Ni ng/m3	Al ng/m3	As ng/m3	Se ng/m3
* January	0.035	1.43	0.81	4.50	2.30	1.84	166	0.04	< d.l.
February	0.035	1.14	1.00	3.52	1.31	2.47	175	0.07	< d.l.
March	0.094	1.03	1.17	8.89	3.82	3.61	154	0.09	< d.l.
** April									
May	0.061	1.23	1.18	7.88	1.37	3.09	273	0.11	< d.l.
June	0.028	1.15	1.34	6.79	8.71	6.35	104	0.35	< d.l.
July	0.031	2.16	0.94	8.08	3.69	2.47	755	0.31	< d.l.
August	0.019	1.57	0.51	5.49	4.65	3.58	97	0.46	< d.l.
September	0.024	0.93	0.88	3.64	3.69	2.47	80	0.52	< d.l.
* October	0.015	1.59	0.86	5.85	1.29	0.59	318	0.59	< d.l.
November	0.030	2.90	1.45	10.10	5.03	3.22	1369	0.32	< d.l.
*** December									
Average	0.04	1.5	1.0	6.5	3.6	3.0	349	0.3	

* Based on exposure for about 20 days.

** Air pump out of order during most of the month.

*** Results not available yet.

Persistent organic pollutants

Stórhöfði 1995 - Air quantity per period

period no.	FROM: date	hour	TO: date	hour	length of period (days)	air flow begin l / min	air flow end l / min	air * quantity m3
1	06/01/1995	14:00	21/01/1995	12:00	14.92	50	50	1074
2	21/01/1995	12:00	04/02/1995	12:00	14.00	50	50	1008
3 **	04/02/1995	12:00	17/02/1995	19:00	13.29	50	10	574
4	17/02/1995	19:00	05/03/1995	10:00	15.63	50	50	1125
5	05/03/1995	10:00	19/03/1995	17:00	14.29	50	50	1029
6	19/03/1995	17:00	03/04/1995	19:00	15.08	50	50	1086
7	03/04/1995	19:00	19/04/1995	10:00	15.63	50	50	1125
8	19/04/1995	10:00	03/05/1995	10:00	14.00	50	50	1008
9	03/05/1995	10:00	17/05/1995	11:00	14.04	50	50	1011
10	17/05/1995	11:00	31/05/1995	18:00	14.29	50	50	1029
11	31/05/1995	18:00	12/06/1995	13:00	11.79	50	48	832
12	12/06/1995	13:00	30/06/1995	18:00	18.21	45	45	1180
13	30/06/1995	18:00	15/07/1995	19:00	15.04	45	45	975
14	15/07/1995	19:00	31/07/1995	12:00	15.71	45	45	1018
15	31/07/1995	12:00	15/08/1995	17:00	15.21	45	45	986
16	15/08/1995	17:00	31/08/1995	19:00	16.08	45	45	1042
17	31/08/1995	19:00	15/09/1995	18:00	14.96	45	45	969
18	15/09/1995	18:00	01/10/1995	16:00	15.92	45	45	1031
19	01/10/1995	16:00	16/10/1995	10:00	14.75	45	35	850
20	16/10/1995	10:00	01/11/1995	13:00	16.13	45	28	848
21 ***	06/11/1995	16:00	15/11/1995	14:00	8.92	45	45	578
22	15/11/1995	14:00	02/12/1995	09:00	16.79	45	45	1088
23	02/12/1995	09:00	16/12/1995	13:00	14.17	45	45	918
24	16/12/1995	13:00	02/01/1996	12:00	16.96	45	45	1099

* Air quantity calculated using average air flow during each period.

** Seasprey: almost no airflow at the end of this period because of seasalt.

*** Short period (9 days instead of 15) with proportionally lowered air quantity.

Persistent organic pollutants

Stórhöfði 1995 - Air foam plugs - POPs contents - ng

period no.	alpha HCH	beta HCH	gamma HCH	p,p'-DDE	p,p'-DDD	p,p'-DDT	HCB	trans CD	cis CD	Dieldrin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	4.5	3.0	10.8	0	0	0	3.2	10.3	0	6.2	0	0.1	20.3	16.4	0	13.0	7.7	8.8	0	1.3
2	8.1	1.0	0	0	2.6	0	3.6	2.9	0	0	0	0.2	1.0	0	0	0	0.5	2.3	0	0.6
3 *	0	0	0	0	0	0	1.0	0	0	0	0	0	9.9	0	0	0	1.2	0.4	0	0.4
4	0	0	15.4	0	4.9	0	4.6	3.0	0	0	0.7	8.5	11.8	0	0	0	0.4	0.6	0	0.5
5	27.5	0	39.6	0	0	0	16.2	6.8	0	0	11.1	8.5	11.4	0.6	0	0	0.8	0.8	0	2.0
6	39.1	0	20.7	0	0	0	15.6	1.8	0	0	2.2	0	2.5	0	0	0	0	0	0	0
7	32.7	0	9.8	0	2.5	0	15.5	4.5	1.8	0	0	0	2.1	0.3	0	0	0	0	0	0
8	22.0	0	26.9	0	4.6	0	11.1	7.9	2.0	0	0	0.6	6.6	0	0	0	0	0	0	0
9	46.5	0	18.6	0	4.1	0	13.3	8.1	0	0	0	0	0.5	0	0	0	0	0	0	0
10	18.5	2.7	51.4	0.8	6.5	0	9.0	1.8	1.6	0	5.2	0	25.1	0	0	0	0.3	0	0	0
11	15.4	2.4	7.1	0	5.7	0	12.3	2.5	1.2	0	5.7	0	23.4	0.2	0	0	0	0	0	0
12	9.2	0	16.2	0.5	0	0	4.4	0.8	1.9	0	13.4	8.1	2.4	0.3	0	0	0	0	0	0
13	7.9	0	16.2	0	0.3	1.7	3.3	0.7	1.6	0	10.3	2.6	3.4	1.0	0	0.2	0.3	0.5	0	0.2
14	11.9	0	8.7	0	0	0	5.2	0.8	1.5	0	10.2	3.0	3.2	1.1	0	0.3	0.3	0.5	0	0.1
15	9.9	0	9.6	0	0	0	4.2	0.8	1.4	0	10.9	2.4	2.0	0.6	0	0.2	0.2	0.3	0	0
16	12.2	0	10.9	0	0	0	4.3	0.9	1.9	0	13.7	3.5	4.0	1.4	0	0.4	0.5	0.7	0	0.1
17	16.8	0	17.9	0	0	0	6.8	0.8	1.3	0	9.4	3.8	4.9	1.2	0	0.3	0.3	0.6	0	0
18	20.8	0	12.0	0	0	0	6.8	0.7	1.3	0	20.3	14	9.7	1.7	0	0	0.5	0.8	0	0.1
19	18.7	0	8.7	0	0	0	9.3	0.6	1.1	0	6.3	2.3	1.4	0.3	0	0	0	0.1	0	0
20	13.3	0	8.9	0	0	0	2.6	0.6	1.2	0	6.8	4.4	2.8	0.7	0	0.1	0.2	0.3	0	0
21 **	16.5	0	7.0	0.6	0.6	1.6	7.0	0.5	0.7	0	7.0	6.0	3.5	0.5	0	0.1	0	0.2	0	0
22	20.1	0	13.0	0	0	0	5.4	0.8	1.0	0	3.3	1.0	2.4	0.5	0	0	0	0.1	0	0
23	16.5	0	8.6	0	0	0	5.6	0.9	1.1	0	3.3	0.9	2.0	0.6	0	0.1	0.1	0.2	0	0
24	23.8	0	8.9	0	0	0	6.8	0.9	1.0	0	7.6	6.4	4.4	0.7	0	0.1	0.1	0.3	0	0

* Seasprey: very low contents of most POPs, at least partly because of diminished airflow.

** Short period; POPs contents are therefore proportionally lower.

Persistent organic pollutants

Stórhöfði 1995 - Air - POPs concentrations - pg/m3

period no.	alpha HCH	beta HCH	gamma HCH	p,p'-DDE	p,p'-DDD	p,p'-DDT	HCB	trans CD	cis CD	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180	* 7 PCB	** 3 PCB
1	4.2	2.8	10.1	0	0	0	3.0	9.6	0	5.8	0	0.1	18.9	15.3	0	12.1	7.2	8.2	0	1.2	62.8	0.1
2	8.0	1.0	0	0	2.6	0	3.6	2.9	0	0	0	0.2	1.0	0	0	0	0.5	2.3	0	0.6	4.4	0.2
3 ***	0	0	0	0	0	0	1.7	0	0	0	0	0	17.2	0	0	0	2.1	0.7	0	0.7	20.7	0
4	0	0	13.7	0	4.4	0	4.1	2.7	0	0	0.6	7.6	10.5	0	0	0	0.4	0.5	0	0.4	12.4	7.6
5	26.7	0	38.5	0	0	0	15.7	6.6	0	0	10.8	8.3	11.1	0.6	0	0	0.8	0.8	0	1.9	25.9	8.3
6	36.0	0	19.1	0	0	0	14.4	1.7	0	0	2.0	0	2.3	0	0	0	0	0	0	0	4.3	0
7	29.1	0	8.7	0	2.2	0	13.8	4.0	1.6	0	0	0	1.9	0.3	0	0	0	0	0	0	2.1	0
8	21.8	0	26.7	0	4.6	0	11.0	7.8	2.0	0	0	0.6	6.5	0	0	0	0	0	0	0	6.5	0.6
9	46.0	0	18.4	0	4.1	0	13.2	8.0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.5	0
10	18.0	2.6	50.0	0.8	6.3	0	8.7	1.7	1.6	0	5.1	0	24.4	0	0	0	0.3	0	0	0	29.7	0
11	18.5	2.9	8.5	0	6.9	0	14.8	3.0	1.4	0	6.9	0	28.1	0.2	0	0	0	0	0	0	35.2	0
12	7.8	0	13.7	0.4	0	0	3.7	0.7	1.6	0	11.4	6.9	2.0	0.3	0	0	0	0	0	0	13.6	6.9
13	8.1	0	16.6	0	0.3	1.7	3.4	0.7	1.6	0	10.6	2.7	3.5	1.0	0	0.2	0.3	0.5	0	0.2	16.3	2.7
14	11.7	0	8.5	0	0	0	5.1	0.8	1.5	0	10.0	2.9	3.1	1.1	0	0.3	0.3	0.5	0	0.1	15.4	2.9
15	10.0	0	9.7	0	0	0	4.3	0.8	1.4	0	11.1	2.4	2.0	0.6	0	0.2	0.2	0.3	0	0	14.4	2.4
16	11.7	0	10.5	0	0	0	4.1	0.9	1.8	0	13.1	3.4	3.8	1.3	0	0.4	0.5	0.7	0	0.1	20.0	3.4
17	17.3	0	18.5	0	0	0	7.0	0.8	1.3	0	9.7	3.9	5.1	1.2	0	0.3	0.3	0.6	0	0	17.2	3.9
18	20.2	0	11.6	0	0	0	6.6	0.7	1.3	0	19.7	13.4	9.4	1.6	0	0	0.5	0.8	0	0.1	32.1	13.4
19	22.0	0	10.2	0	0	0	10.9	0.7	1.3	0	7.4	2.7	1.6	0.4	0	0	0	0.1	0	0	9.5	2.7
20	15.7	0	10.5	0	0	0	3.1	0.7	1.4	0	8.0	5.2	3.3	0.8	0	0.1	0.2	0.4	0	0	12.9	5.2
21****	28.6	0	12.1	1.0	1.0	2.8	12.1	0.9	1.2	0	12.1	10.4	6.1	0.9	0	0.2	0	0.3	0	0	19.6	10.4
22	18.5	0	11.9	0	0	0	5.0	0.7	0.9	0	3.0	0.9	2.2	0.5	0	0	0	0.1	0	0	5.8	0.9
23	18.0	0	9.4	0	0	0	6.1	1.0	1.2	0	3.6	1.0	2.2	0.7	0	0.1	0.1	0.2	0	0	6.9	1.0
24	21.7	0	8.1	0	0	0	6.2	0.8	0.9	0	6.9	5.8	4.0	0.6	0	0.1	0.1	0.3	0	0	12.0	5.8
average	17.5	0.4	14.4	0.1	1.3	0.2	7.6	2.4	1.0	0.2	6.3	3.3	7.1	1.1	0	0.6	0.6	0.7	0	0.2		
0.82	: average gamma-HCH / average alpha-HCH																					

* Combined concentration of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

** Combined concentration of three additional PCB congeners: PCB -31, -105 and -156.

*** Seaspray effect ? Concentrations of most POPs are low, but not all and therefore this sample is included in the annual average.

**** Short but successful measurement period; these concentrations are considered representative for the whole period (1/11 - 15/11)

Persistent organic pollutants

Stórhöfði 1995 - Precipitation quantity per period

period no.	FROM: date	hour	TO: date	hour	length of period (days)	precipitation quantity (mm) sampling equipment (litres per m2) = mm	standard WMO gauge	ratio
1	06/01/1995	14:00	21/01/1995	12:00	14.92	18	62	3.4
2	21/01/1995	12:00	04/02/1995	12:00	14.00	11	35	3.2
3	04/02/1995	12:00	17/02/1995	19:00	13.29	4	9	2.3
4	17/02/1995	19:00	05/03/1995	10:00	15.63	25	58	2.3
5	05/03/1995	10:00	19/03/1995	17:00	14.29	5	15	3.0
6	19/03/1995	17:00	03/04/1995	19:00	15.08	24	75	3.1
7	03/04/1995	19:00	19/04/1995	10:00	15.63	16	53	3.3
8	19/04/1995	10:00	03/05/1995	10:00	14.00	6	18	3.0
9	03/05/1995	10:00	17/05/1995	11:00	14.04	8	16	2.0
10	17/05/1995	11:00	31/05/1995	18:00	14.29	29	35	1.2
11	31/05/1995	18:00	12/06/1995	13:00	11.79	5	5.3	1.1
12	12/06/1995	13:00	30/06/1995	18:00	18.21	41	95	2.3
13	30/06/1995	18:00	15/07/1995	19:00	15.04	12	38	3.2
14	15/07/1995	19:00	31/07/1995	12:00	15.71	15	37	2.5
15	31/07/1995	12:00	15/08/1995	17:00	15.21	47	101	2.1
16	15/08/1995	17:00	31/08/1995	19:00	16.08	32	79	2.5
17	31/08/1995	19:00	15/09/1995	18:00	14.96	58	77	1.3
18	15/09/1995	18:00	01/10/1995	16:00	15.92	37	80	2.2
19	01/10/1995	16:00	16/10/1995	10:00	14.75	46	47	1.0
20	16/10/1995	10:00	01/11/1995	13:00	16.13	54	57	1.1
21	01/11/1995	13:00	15/11/1995	14:00	14.04	5	16	3.2
22	15/11/1995	14:00	02/12/1995	09:00	16.79	17	29	1.7
23	02/12/1995	09:00	16/12/1995	13:00	14.17	38	113	3.0
24	16/12/1995	13:00	02/01/1996	12:00	16.96	9	20	2.2
sum							1170	

Persistent organic pollutants

Stórhöfði 1995 - Precipitation foam plugs - POPs contents - ng

period no.	alpha HCH	beta HCH	gamma HCH	p,p'-DDE	p,p'-DDD	p,p'-DDT	HCB	trans CD	cis CD	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	24.6	1.1	0	2.0	4.8	0	0.7	0	1.0	3.2	0	0	0	1.1	0	3.1	1.9	1.4	2.4	3.2
2	20.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.7
3	12.9	0	0	0	5.2	0	0	0	0	0	0	0	0	0.5	0	0	1.3	1.3	0	1.1
4	31.6	0.7	0	1.9	8.0	0	1.4	0	0.8	6.6	0	0	0	0	0	0	0	0.2	0	0.2
5	14.8	0	0	0	2.0	0	0.8	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1
6	39.9	0.5	0	1.6	4.3	0	0.9	0	0	4.5	0	0	0	0.5	0	2.2	1.1	1.2	0	3.1
7	20.5	0	0	1.0	3.6	0	0.9	0	0	0	0	0	0	0.1	0	0	0.9	1	0	1.7
8	13.0	0	0	0	0	0	1.5	0.2	0	0	0	0	0	0	0	0	0	0	0	0
9	20.8	0	0	0	0	0	1.1	0.3	0	0	1.8	0.6	0	0.4	0	0	0	0	0	0.2
10	22.0	0	198.0	0	0	0	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4.0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	0	0	0.5	0	0	0.6
12	9.3	0	10.0	0	0	8.1	0.9	0	0	1.2	8.1	7.4	3.4	1.6	0	0	1.1	1.2	0	1.4
13	4.4	0	8.9	4.0	20.4	65.5	1.0	0	0	0	13.8	13.3	5.6	2.7	0	1.9	1.9	1.7	0	1.6
14	5.2	0	6.2	0.5	0	0	0.3	0	0	0	6.1	6.7	3.0	0.4	0	1.0	1.0	0.2	0	0.4
15	5.0	0	6.3	0	0	0	1.0	0	0	0.7	15.8	14.9	3.8	1.3	0	0	1.7	0.6	0	2.8
16	8.8	0	5.9	0	0	1.4	0.5	0	0	0	0	0	0.5	0.2	0	0.8	0.8	1.5	0	2.6
17	18.5	1.7	52.6	0	0	0	0.9	0	0	1.4	2.1	1.4	1.5	0	0	0	0.7	0.3	0	0.7
18	23.4	0.7	13.4	0	0	0	1.3	0	0	3.2	52.7	45.2	11.9	4.4	0	3.2	3.6	3.5	0	3.4
19	22.3	1.6	17.2	0	0	0	1.2	0	0	0.4	29.3	29.3	8.3	3.1	0	2.3	3.3	3.0	0	2.8
20	20.5	1.1	8.8	0	0	0	0.9	0	0	2.1	12.7	9.0	2.6	0.6	0	0.7	1.8	1.1	0	3.0
21	3.3	0	3.6	0	0	0	0.1	0	0	0	0	0	0	0	0	0.6	0	0	0	0.4
22	5.9	0	5.0	0.4	0	0	1.1	0	0	0	1.5	1.2	0.6	0.7	0	1.5	0.9	0.4	0	1.2
23	14.5	0	7.9	0	0	0	0.7	0	0	1.9	1.9	1.8	1.4	0.2	0	2.0	0.5	0	0	1.5
24	8.2	0	3.7	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0.3	0	0	0.9
Cleans. A	0	0	0.3	70.1	46.0	0	6.5	11.8	0	0	0	0	0	11.8	0	17.2	23.2	25.7	0	19.5
Cleans. B	1.1	0	2.9	6.0	0	0	0	0	0	0	5.8	5.6	2.4	1.9	0	0.9	1.2	1.5	0	0.7

Cleansing: Blank corrected analysis of cotton wool used to wipe the surface of the sampling equipment.
Cleans. A: Performed 12.06.1995. Considered to be accidentally contaminated, neither from precipitation nor air.
Cleans. B: Performed 02.01.1996. POPs contents low or moderate except perhaps for p,p'-DDE (considered accidental).

Persistent organic pollutants

Stórhöfði 1995 - Precipitation - POPs concentrations * - ng/l

period no.	alpha HCH	beta HCH	gamma HCH	p,p'-DDE	p,p'-DDD	p,p'-DDT	HCB	trans CD	cis CD	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	1.37	0.06	0	0.11	0.27	0	0.04	0	0.06	0.18	0	0	0	0.06	0	0.17	0.11	0.08	0.13	0.18
2	1.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0.06
3	3.23	0	0	0	1.30	0	0	0	0	0	0	0	0	0.13	0	0	0.33	0.33	0	0.28
4	1.26	0.03	0	0.08	0.32	0	0.06	0	0.03	0.26	0	0	0	0	0	0	0	0.01	0	0.01
5	2.96	0	0	0	0.40	0	0.16	0	0	0	0	0	0	0	0	0	0	0.04	0	0.02
6	1.66	0.02	0	0.07	0.18	0	0.04	0	0	0.19	0	0	0	0.02	0	0.09	0.05	0.05	0	0.13
7	1.28	0	0	0.06	0.23	0	0.06	0	0	0	0	0	0	0.01	0	0	0.06	0.06	0	0.11
8	2.17	0	0	0	0	0	0.25	0.03	0	0	0	0	0	0	0	0	0	0	0	0
9	2.60	0	0	0	0	0	0.14	0.04	0	0	0.23	0.08	0	0.05	0	0	0	0	0	0.03
10	0.76	0	6.83	0	0	0	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0.80	0	0	0	0	0	0	0	0	0	0	0	0	0.16	0	0	0.10	0	0	0.12
12	0.23	0	0.24	0	0	0.20	0.02	0	0	0.03	0.20	0.18	0.08	0.04	0	0	0.03	0.03	0	0.03
13	0.37	0	0.74	0.33	1.70	5.46	0.08	0	0	0	1.15	1.11	0.47	0.23	0	0.16	0.16	0.14	0	0.13
14	0.35	0	0.41	0.03	0	0	0.02	0	0	0	0.41	0.45	0.20	0.03	0	0.07	0.07	0.01	0	0.03
15	0.11	0	0.13	0	0	0	0.02	0	0	0.01	0.34	0.32	0.08	0.03	0	0	0.04	0.01	0	0.06
16	0.28	0	0.18	0	0	0.04	0.02	0	0	0	0	0	0.02	0.01	0	0.03	0.03	0.05	0	0.08
17	0.32	0.03	0.91	0	0	0	0.02	0	0	0.02	0.04	0.02	0.03	0	0	0	0.01	0.01	0	0.01
18	0.63	0.02	0.36	0	0	0	0.04	0	0	0.09	1.42	1.22	0.32	0.12	0	0.09	0.10	0.09	0	0.09
19	0.48	0.03	0.37	0	0	0	0.03	0	0	0.01	0.64	0.64	0.18	0.07	0	0.05	0.07	0.07	0	0.06
20	0.38	0.02	0.16	0	0	0	0.02	0	0	0.04	0.24	0.17	0.05	0.01	0	0.01	0.03	0.02	0	0.06
21	0.66	0	0.72	0	0	0	0.02	0	0	0	0	0	0	0	0	0.12	0	0	0	0.08
22	0.35	0	0.29	0.02	0	0	0.06	0	0	0	0.09	0.07	0.04	0.04	0	0.09	0.05	0.02	0	0.07
23	0.38	0	0.21	0	0	0	0.02	0	0	0.05	0.05	0.05	0.04	0.01	0	0.05	0.01	0	0	0.04
24	0.91	0	0.41	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0.03	0	0	0.10
wt.mean	0.76	0.01	0.44	0.03	0.12	0.20	0.04	0	0	0.05	0.24	0.22	0.07	0.03	0	0.04	0.04	0.04	0.01	0.07
wt.mean	all HCHs = 1.20			all DDTs = 0.35							** 7 PCBs = 0.54									
0.58	: wt.mean gamma-HCH / wt.mean alpha-HCH																			

* Concentration derived using precipitation quantity as measured in sampling equipment.

** Combined concentration of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

wt.mean: Annual weighted mean concentration (see text).

Persistent organic pollutants

Stórhöfði 1995 - Precipitation - POPs depositions * - ng/m2

period no.	alpha HCH	beta HCH	gamma HCH	p,p'-DDE	p,p'-DDD	p,p'-DDT	HCB	trans CD	cis CD	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180	** 7 PCB	*** 3 PCB
1	84.7	3.8	0	6.9	16.5	0	2.4	0	3.4	11.0	0	0	0	3.8	0	10.7	6.5	4.8	8.3	11.0	36.9	8.3
2	66.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	0	2.2	3.2	0
3	29.0	0	0	0	11.7	0	0	0	0	0	0	0	0	1.1	0	0	2.9	2.9	0	2.5	9.5	0
4	73.3	1.6	0	4.4	18.6	0	3.2	0	1.9	15.3	0	0	0	0	0	0	0	0.5	0	0.5	0.9	0
5	44.4	0	0	0	6.0	0	2.4	0	0	0	0	0	0	0	0	0	0	0.6	0	0.3	0.9	0
6	124.7	1.6	0	5.0	13.4	0	2.8	0	0	14.1	0	0	0	1.6	0	6.9	3.4	3.8	0	9.7	25.3	0
7	67.9	0	0	3.3	11.9	0	3.0	0	0	0	0	0	0	0.3	0	0	3.0	3.3	0	5.6	12.3	0
8	39.0	0	0	0	0	0	4.5	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	41.6	0	0	0	0	0	2.2	0.6	0	0	3.6	1.2	0	0.8	0	0	0	0	0	0.4	4.8	1.2
10	26.6	0	239.0	0	0	0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0.8	0	0	0.5	0	0	0.6	2.0	0
12	21.5	0	23.2	0	0	18.8	2.1	0	0	2.8	18.8	17.1	7.9	3.7	0	0	2.5	2.8	0	3.2	38.9	17.1
13	13.9	0	28.2	12.7	64.6	207.4	3.2	0	0	0	43.7	42.1	17.7	8.6	0	6.0	6.0	5.4	0	5.1	92.5	42.1
14	12.8	0	15.3	1.2	0	0	0.7	0	0	0	15.0	16.5	7.4	1.0	0	2.5	2.5	0.5	0	1.0	29.8	16.5
15	10.7	0	13.5	0	0	0	2.1	0	0	1.5	34.0	32.0	8.2	2.8	0	0	3.7	1.3	0	6.0	55.9	32.0
16	21.7	0	14.6	0	0	3.5	1.2	0	0	0	0	0	1.2	0.5	0	2.0	2.0	3.7	0	6.4	15.8	0
17	24.6	2.3	69.8	0	0	0	1.2	0	0	1.9	2.8	1.9	2.0	0	0	0	0.9	0.4	0	0.9	7.0	1.9
18	50.6	1.5	29.0	0	0	0	2.8	0	0	6.9	113.9	97.7	25.7	9.5	0	6.9	7.8	7.6	0	7.4	178.8	97.7
19	22.8	1.6	17.6	0	0	0	1.2	0	0	0.4	29.9	29.9	8.5	3.2	0	2.4	3.4	3.1	0	2.9	53.2	29.9
20	21.6	1.2	9.3	0	0	0	1.0	0	0	2.2	13.4	9.5	2.7	0.6	0	0.7	1.9	1.2	0	3.2	23.8	9.5
21	10.6	0	11.5	0	0	0	0.3	0	0	0	0	0	0	0	0	1.9	0	0	0	1.3	3.2	0
22	10.1	0	8.5	0.7	0	0	1.9	0	0	0	2.6	2.0	1.0	1.2	0	2.6	1.5	0.7	0	2.0	11.6	2.0
23	43.1	0	23.5	0	0	0	2.1	0	0	5.7	5.7	5.4	4.2	0.6	0	5.9	1.5	0	0	4.5	22.3	5.4
24	18.2	0	8.2	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0.7	0	0	2.0	2.7	0
sum	884.0	13.5	511.1	34.2	142.8	229.6	43.2	1.2	5.3	61.7	283.4	255.4	86.5	40.1	0	48.4	50.8	43.4	8.3	78.7		
periods 19-24	all HCHs = 208			all DDTs = 0.7							** 7 PCBs = 117											

* Deposition derived using precipitation quantity as measured in a standard WMO gauge at the station.

** Sum deposition of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

*** Sum deposition of three additional PCB congeners: PCB -31, -105 and -156.

sum : Annual sum deposition.

periods 19-24: Sum of depositions in the earlier half of winter season 1995 - 1996 (see Appendix D, p. D2).

Persistent organic pollutants

Stórhöfði 1996 - Air quantity per period

period no.	FROM: date hour	TO: date hour	length of period (days)	air flow begin l / min	air flow end l / min	air * quantity m3
1	02/01/1996-12:00	16/01/1996-11:00	13.96	45	45	905
2	16/01/1996-11:00	31/01/1996-11:00	15.00	45	45	972
3	31/01/1996-11:00	15/02/1996-17:00	15.25	45	45	988
4	15/02/1996-17:00	01/03/1996-16:00	14.96	45	45	969
5	01/03/1996-16:00	16/03/1996-17:00	15.04	45	45	975
6	16/03/1996-17:00	01/04/1996-10:00	15.71	45	46	1029
7	01/04/1996-10:00	15/04/1996-18:00	14.33	47	46	960
8	15/04/1996-18:00	30/04/1996-19:00	15.04	46	46	996
9	30/04/1996-19:00	17/05/1996-18:00	16.96	47	46	1136
10	17/05/1996-18:00	01/06/1996-23:00	15.21	48	48	1051
11	01/06/1996-23:00	16/06/1996-11:00	14.50	48	46	981
12 **	16/06/1996-11:00	01/07/1996-22:00	15.46	47	46	1035
13	01/07/1996-22:00	16/07/1996-19:00	14.88	47	47	1007
14	16/07/1996-19:00	03/08/1996-09:00	17.58	47	47	1190
15	03/08/1996-09:00	17/08/1996-10:00	14.04	47	47	950
16	17/08/1996-10:00	01/09/1996-17:00	15.29	47	47	1035
17	01/09/1996-17:00	16/09/1996-14:00	14.88	47	47	1007
18	16/09/1996-14:00	02/10/1996-14:00	16.00	48	48	1106
19	02/10/1996-14:00	15/10/1996-13:00	12.96	48	50	914
20	15/10/1996-13:00	01/11/1996-11:00	16.92	48	48	1169
21	01/11/1996-11:00	16/11/1996-15:00	15.17	48	48	1048
22	16/11/1996-15:00	01/12/1996-13:00	14.92	49	48	1042
23	01/12/1996-13:00	19/12/1996-11:00	17.92	48	48	1238
24***	19/12/1996-11:00	02/01/1997-11:00	14.00	48	48	968

* Air quantity calculated using average air flow during each period.
** Fly in foam plug from period 16/06/1996 - 01/07/1996.
*** Seaspray salt in foam plug from period 19/12/1996 - 02/01/1997.

Persistent organic pollutants

Stórhöfði 1996 - Air foam plugs - POPs contents - ng

period no.	alpha HCH	beta HCH	gamma HCH	o,p'-DDE	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	HCB	trans CD	cis CD	trans NO	Dield-rin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	10.7	0	6.7	0	0.4	0	0.3	0.0	5.9	0.7	0.9	0.8	0.6	0	0	0.4	0	0	0	0	0	0	0
2	16.9	0	6.1	0	0.3	0	0	0.0	6.6	0.6	0.8	0.6	0.9	7.2	8.0	6.4	0	0.4	0.4	1.3	1.2	0.2	3.7
3	20.1	0	9.0	0	2.3	6.4	1.4	112.0	5.3	0.6	1.0	0.9	0.4	1.9	0	1.4	1.6	0	0	0.2	0.6	0	0.7
4	38.0	0	6.7	0	0.6	0.7	1.1	9.1	6.1	0.6	0.7	0.6	0	4.2	2.6	3.0	0.3	1.2	3.6	4.1	5.6	0.4	1.8
5	20.2	0	11.1	0	1.1	0	1.1	1.4	6.7	0.8	0.7	0.7	0.9	16.2	16.7	6.3	4.1	1.4	4.1	5.8	6.7	0.4	3.2
6	29.3	0	14.5	0.6	1.1	0.3	1.4	4.0	8.3	0.8	0.8	0.6	1.0	23.6	26.1	8.2	7.9	3.0	10.0	10.9	15.3	0.8	2.9
7	12.3	0	12.6	0	3.0	6.1	2.7	123.0	5.4	0.7	0.9	0.7	0.7	2.9	0	1.0	1.7	0.9	2.2	2.5	3.8	0.2	0.6
8	16.1	0	18.3	0	0.3	0	0.3	0	5.3	0.6	0.7	0.7	0.7	3.9	0	2.2	0.3	0.4	0.3	0.6	0.4	0	0.3
9	12.7	0	7.8	1.1	0.3	0	0.4	0	6.8	0.6	1.0	0.9	1.0	6.5	0	0.9	0.2	0	0.2	0	0	0	0
10	11.1	0	34.0	0.9	0.3	0	0.4	0	5.7	0.5	0.8	0.7	0.9	4.3	0	1.6	0.8	0.5	0.4	1.1	0.8	0.2	0.9
11	9.6	0	11.1	1.1	0.8	0.9	1.0	8.3	6.2	0.5	0.8	0.6	1.1	7.3	0	1.4	0.6	0	0.2	0.5	0.5	0	0.2
12 *	8.0	0	7.2	1.3	0.4	0	0.6	0	5.1	0.5	0.9	0.7	0.9	9.8	0	2.3	1.4	0.8	1.4	2.2	2.6	0.2	1.1
13	9.9	0	6.4	1.3	0.5	0	0.7	1.7	5.4	0.5	0.9	0	0.8	8.1	0	1.3	1.3	0.7	1.2	1.8	2.2	0.2	0.6
14	9.8	0	4.8	0	0	0	0	0	4.8	0	0	0.9	0.8	2.9	0.6	0.4	0.4	0	0	0	0.1	0	0.6
15	8.2	0	4.7	0	0	0	0	0	4.2	0	0	0.5	0.8	2.0	3.4	0.9	1.2	0	0.2	0.9	1.3	0	0.2
16	9.0	0	3.7	0	0	0	0	0	4.5	0	0	0.6	0.7	2.0	1.5	0.3	0	0	0	0	0	0	0
17	8.2	0	9.7	0	0	0	0	0.5	4.7	0	1.0	0.6	0.9	0	0	0	0	0	0	0	0	0	0
18	12.7	0	8.7	0	0	0	0	1.1	6.9	0	0.9	0.6	0.9	7.1	7.3	3.2	0.5	0	0.2	0	0.2	0	0.5
19	25.1	0	7.6	0	0	0.3	0.3	2.1	7.4	0.3	0.6	0.5	0.8	1.5	2.1	1.1	0.4	0	0	0	0.3	0	0
20	18.2	0	10.8	0	0.6	0.5	0.4	3.5	12.5	0.5	0.8	0.9	0.9	1.8	2.1	1.7	0.4	0	0	0	0.2	0	0
21	26.6	0	14.1	0	0.8	0.3	0.4	2.1	10.6	0.5	0.8	0.6	0.9	1.2	1.2	1.7	0.4	0	0	0	0	0	0
22	22.1	0	10.1	0	0.5	0.3	0.4	2.1	5.9	0.5	0.7	0.6	0.7	4.4	5.1	1.8	0.5	0	0.1	0.1	0.3	0	0
23	22.1	0	7.1	0	1.3	2.0	0.8	15.6	8.4	0.5	0.8	0.6	0.4	5.3	6.2	2.6	0.6	0	0.1	0.4	0.8	0	0.3
24 **	12.0	0	4.3	0	0.7	0.5	0.3	2.3	8.0	0.7	0.8	0.7	0.7	1.3	1.4	1.4	0.2	0	0	0	0	0	0

* Fly in the foam plug: POPs contents of this sample are not different from POPs contents of other samples.

** Seaspray salt in the foam plug: Contents of most POPs in this sample are rather low but not exceptionally so.

Persistent organic pollutants

Stórhöfði 1996 - Air - POPs concentrations - pg/m3

period no.	alpha HCH	beta HCH	gamma HCH	o,p'-DDE	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	HCB	trans CD	cis CD	trans NO	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180	* 7 PCB	** 3 PCB
1	11.8	0	7.4	0	0.4	0	0.3	0	6.5	0.8	1.0	0.9	0.7	0	0	0.4	0	0	0	0	0	0	0	0.4	0
2	17.4	0	6.3	0	0.3	0	0	0	6.8	0.6	0.8	0.6	0.9	7.4	8.2	6.6	0	0.4	0.4	1.3	1.2	0.2	3.8	20.8	8.8
3	20.3	0	9.1	0	2.3	6.5	1.4	113.3	5.4	0.6	1.0	0.9	0.4	1.9	0	1.4	1.6	0	0	0.2	0.6	0	0.7	6.5	0
4	39.2	0	6.9	0	0.6	0.7	1.1	9.4	6.3	0.6	0.7	0.6	0	4.3	2.7	3.1	0.3	1.2	3.7	4.2	5.8	0.4	1.9	23.3	4.3
5	20.7	0	11.4	0	1.1	0	1.1	1.4	6.9	0.8	0.7	0.7	0.9	16.6	17.1	6.5	4.2	1.4	4.2	6.0	6.9	0.4	3.3	47.6	19.0
6	28.5	0	14.1	0.6	1.1	0.3	1.4	3.9	8.1	0.8	0.8	0.6	1.0	22.9	25.4	8.0	7.7	2.9	9.7	10.6	14.9	0.8	2.8	76.6	29.1
7	12.8	0	13.1	0	3.1	6.4	2.8	128.2	5.6	0.7	0.9	0.7	0.7	3.0	0	1.0	1.8	0.9	2.3	2.6	4.0	0.2	0.6	15.3	1.1
8	16.2	0	18.4	0	0.3	0	0.3	0	5.3	0.6	0.7	0.7	0.7	3.9	0	2.2	0.3	0.4	0.3	0.6	0.4	0	0.3	8.0	0.4
9	11.2	0	6.9	1.0	0.3	0	0.4	0	6.0	0.5	0.9	0.8	0.9	5.7	0	0.8	0.2	0	0.2	0	0	0	0	6.9	0
10	10.6	0	32.3	0.9	0.3	0	0.4	0	5.4	0.5	0.8	0.7	0.9	4.1	0	1.5	0.8	0.5	0.4	1.0	0.8	0.2	0.9	9.4	0.7
11	9.8	0	11.3	1.1	0.8	0.9	1.0	8.5	6.3	0.5	0.8	0.6	1.1	7.4	0	1.4	0.6	0	0.2	0.5	0.5	0	0.2	10.9	0
12	7.7	0	7.0	1.3	0.4	0	0.6	0	4.9	0.5	0.9	0.7	0.9	9.5	0	2.2	1.4	0.8	1.4	2.1	2.5	0.2	1.1	20.1	1.0
13	9.8	0	6.4	1.3	0.5	0	0.7	1.7	5.4	0.5	0.9	0	0.8	8.0	0	1.3	1.3	0.7	1.2	1.8	2.2	0.2	0.6	16.4	0.9
14	8.2	0	4.0	0	0	0	0	0	4.0	0	0	0.8	0.7	2.4	0.5	0.3	0.3	0	0	0	0.1	0	0.5	3.7	0.5
15	8.6	0	4.9	0	0	0	0	0	4.4	0	0	0.5	0.8	2.1	3.6	0.9	1.3	0	0.2	0.9	1.4	0	0.2	7.1	3.6
16	8.7	0	3.6	0	0	0	0	0	4.3	0	0	0.6	0.7	1.9	1.4	0.3	0	0	0	0	0	0	0	2.2	1.4
17	8.1	0	9.6	0	0	0	0	0.5	4.7	0	1.0	0.6	0.9	0	0	0	0	0	0	0	0	0	0	0	0
18	11.5	0	7.9	0	0	0	0	1.0	6.2	0	0.8	0.5	0.8	6.4	6.6	2.9	0.5	0	0.2	0	0.2	0	0.5	10.6	6.6
19	27.5	0	8.3	0	0	0.3	0.3	2.3	8.1	0.3	0.7	0.5	0.9	1.6	2.3	1.2	0.4	0	0	0	0.3	0	0	3.6	2.3
20	15.6	0	9.2	0	0.5	0.4	0.3	3.0	10.7	0.4	0.7	0.8	0.8	1.5	1.8	1.5	0.3	0	0	0	0.2	0	0	3.5	1.8
21	25.4	0	13.5	0	0.8	0.3	0.4	2.0	10.1	0.5	0.8	0.6	0.9	1.1	1.1	1.6	0.4	0	0	0	0	0	0	3.1	1.1
22	21.2	0	9.7	0	0.5	0.3	0.4	2.0	5.7	0.5	0.7	0.6	0.7	4.2	4.9	1.7	0.5	0	0.1	0.1	0.3	0	0	6.9	4.9
23	17.8	0	5.7	0	1.0	1.6	0.6	12.6	6.8	0.4	0.6	0.5	0.3	4.3	5.0	2.1	0.5	0	0.1	0.3	0.6	0	0.2	8.2	5.0
24***	12.4	0	4.4	0	0.7	0.5	0.3	2.4	8.3	0.7	0.8	0.7	0.7	1.3	1.4	1.4	0.2	0	0	0	0	0	0	3.0	1.4
average	15.9	0	9.6	0.3	0.6	0.8	0.6	12.2	6.3	0.5	0.7	0.6	0.7	5.1	3.4	2.1	1.0	0.4	1.0	1.3	1.8	0.1	0.7		

0.61 : average gamma-HCH / average alpha-HCH

* Combined concentration of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

** Combined concentration of three additional PCB congeners: PCB -31, -105 and -156.

*** Seaspray salt in the sample: Concentration of most POPs, but not all, is rather low. This sample is included in the annual average.

Persistent organic pollutants

Stórhöfði 1996 - Precipitation quantity per period

period no.	FROM: date hour	TO: date hour	length of period (days)	precipitation quantity (mm) sampling equipment (litres per m2) = mm	standard WMO gauge	ratio
1	02/01/1996-12:00	16/01/1996-11:00	13.96	28	49	1.8
2	16/01/1996-11:00	31/01/1996-11:00	15.00	30	48	1.6
3	31/01/1996-11:00	15/02/1996-17:00	15.25	71	114	1.6
4	15/02/1996-17:00	01/03/1996-16:00	14.96	29	61	2.1
5	01/03/1996-16:00	16/03/1996-17:00	15.04	39	91	2.3
6	16/03/1996-17:00	01/04/1996-10:00	15.71	3	4	1.3
7	01/04/1996-10:00	15/04/1996-18:00	14.33	18	53	2.9
8	15/04/1996-18:00	30/04/1996-19:00	15.04	9	16	1.8
9	30/04/1996-19:00	17/05/1996-18:00	16.96	25	53	2.1
10	17/05/1996-18:00	01/06/1996-23:00	15.21	17	33	1.9
11	01/06/1996-23:00	16/06/1996-11:00	14.50	37	61	1.6
12 *	16/06/1996-11:00	01/07/1996-22:00	15.46	15	34	2.3
13	01/07/1996-22:00	16/07/1996-19:00	14.88	27	67	2.5
14	16/07/1996-19:00	03/08/1996-09:00	17.58	52	95	1.8
15	03/08/1996-09:00	17/08/1996-10:00	14.04	32	62	1.9
16	17/08/1996-10:00	01/09/1996-17:00	15.29	33	68	2.1
17	01/09/1996-17:00	16/09/1996-14:00	14.88	35	79	2.3
18	16/09/1996-14:00	02/10/1996-14:00	16.00	59	122	2.1
19 **	02/10/1996-14:00	15/10/1996-13:00	12.96	20	44	2.2
20	15/10/1996-13:00	01/11/1996-11:00	16.92	55	105	1.9
21	01/11/1996-11:00	16/11/1996-15:00	15.17	20	37	1.9
22	16/11/1996-15:00	01/12/1996-13:00	14.92	22	62	2.8
23***	01/12/1996-13:00	19/12/1996-11:00	17.92	30	50	1.7
24	19/12/1996-11:00	02/01/1997-11:00	14.00	13	28	2.2
sum					1436	

* Flies and dirt in foam plug from period 16/06 - 01/07 1996.
** Dirt in foam plug from period 02/10 - 15/10 1996.
*** Pieces of aluminium foil on the foam plug from period 01/12 - 19/12 1996.

Persistent organic pollutants

Stórhöfði 1996 - Precipitation foam plugs - POPs contents - ng

period no.	alpha HCH	beta HCH	gamma HCH	o,p'-DDE	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	HCB	trans CD	cis CD	trans NO	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	11.0	0	8.0	0	0.6	1.3	1.0	4.4	0.4	0	0.1	0	1.3	1.0	0	0.6	2.2	1.4	3.2	4.6	5.7	0.5	1.7
2	10.3	0.7	4.5	0	0.6	0.4	0	2.1	0.4	0.3	0.4	0	1.1	1.6	0	0.8	3.0	1.6	3.0	7.1	7.3	0.7	3.1
3	24.5	0	5.1	0	2.0	6.9	1.8	26.2	0.8	1.1	0.4	0	2.4	2.6	1.7	2.4	2.2	0.7	2.1	5.3	5.0	0.6	2.3
4	23.2	0.6	5.9	0	0.4	0.2	0.9	0	0.5	0.3	0.2	0	1.3	0	0	1.0	4.2	1.7	4.7	5.6	5.2	0.6	2.8
5	27.0	0	19.6	0	0.5	1.9	0.8	6.4	0.5	0.9	0.3	0	1.4	2.0	0	3.2	1.8	0.8	1.4	2.5	2.4	0.4	1.6
6	4.9	0.5	7.8	0	0.2	0	0.6	0	0.3	0.1	0	0.1	0	0	0	0	1.1	0.4	0.4	2.2	1.9	0.2	1.1
7	10.7	0	10.5	0	0.2	0.7	0.7	1.0	0.2	0	0.2	0	0.8	0	0	0	1.0	0.7	0.5	2.2	2.0	0.2	1.0
8	5.4	0	7.3	0	0	0	0.7	0	0.2	0.1	0	0.1	0.5	0	0	0.5	0.9	0.5	0.6	2.4	2.1	0.2	2.0
9	9.9	0	5.4	0	0.4	0.8	0.7	2.0	0.2	0.4	0.1	0.2	0.6	0	0	0.4	1.0	0.8	1.0	2.5	2.3	0.2	2.4
10	5.3	0	23.6	0	0.6	2.7	0.8	9.8	0.2	0.1	0	0	0.9	5.9	7.4	2.6	1.0	0.6	0.6	2.7	2.4	0.3	3.9
11	5.2	0	21.1	0	0.3	0.7	0.5	2.9	0.2	0.1	0	0.1	0.7	2.1	2.1	1.1	0.5	0.5	0.5	1.9	1.7	0.2	1.2
12 *	4.7	0	3.5	0	0.5	0.9	0.9	3.0	0.1	0.1	0.2	0.5	1.2	2.7	2.2	1.1	3.0	1.0	2.2	3.6	4.1	1.0	1.8
13	7.0	0	4.3	0	0.3	0.9	0.8	1.7	0.2	0.1	0.1	0.2	0.6	3.7	3.0	1.0	2.4	1.4	1.9	3.6	3.7	1.4	2.2
14	11.9	0	5.1	0	0	0	0.4	0	0.7	0	0	0	1.2	1.9	1.8	1.7	0.4	0	0.3	0.2	0.8	0	0.4
15	9.5	0	4.4	0	0.4	0	0.3	0.4	0.5	0	0	0	0.7	0	0	0.2	1.0	0	0.9	0	1.0	0	0.6
16	12.4	0	3.6	0	0	0	0	1.0	0.6	0	0	0	0.5	0	0	0.1	0	0	0.1	0	0.3	0	0.2
17	6.0	0	4.9	0	0	0	0.5	1.7	0.1	0	0	0	0.5	1.2	2.0	0.8	0	0	0	0	0.1	0	0.2
18	12.2	0	5.0	0	0.4	0	1.2	3.6	0.3	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0
19 **	10.7	0	5.7	0	0	0.3	0.5	4.4	0.4	0	0	0	1.0	0.1	0.5	5.2	4.0	0	2.6	0.7	1.8	0	0.3
20	22.5	0	12.1	0	0.6	1.3	1.6	17.5	0.8	0	0	0	1.8	5.9	6.3	1.9	0.4	0	0.1	0.5	0.7	0	0.3
21	20.9	0	9.0	0	0	0	1.7	1.7	0.4	0	0	0	1.1	2.2	2.1	0.5	0.1	0	0	0	0	0	0
22	13.6	0	7.7	0	0	0	0.8	0.4	0.7	0	0	0	1.6	43.7	46.0	11.2	0.5	0	0.3	0	0.8	0	0.2
23 ***	10.8	0	3.0	0	0.8	0	1.7	38.2	0.2	0	0	0	1.8	9.6	12.2	2.7	0	0	0.1	0	0.1	0	0.1
24	5.1	0	2.8	0	0	0	0	0.7	0.1	0	0	0	0.6	13.1	13.0	3.5	0.4	0	0.2	0	0.1	0	0
Cleansing	0	0	4.0	0	1.0	0.1	0.3	0	0.3	0	0	0	0	4.4	3.1	2.6	3.5	0	2.5	3.6	4.8	0	1.2

* POPs contents of this sample are similar to those of other samples (except trans-NO: coincidence) in spite of flies and dirt in the foam plug.

** POPs contents of this sample are similar to POPs contents of other samples in spite of dirt in the foam plug.

*** This sample, which had pieces of aluminium foil on the foam plug, has high p,p'-DDT but an otherwise typical POP content.

Cleansing: Blank corrected analysis of cotton wool used to wipe the surface of the sampling equipment 31.01.1997, approximately at the end of 1996. POPs contents of cleansing are low or moderate and would hardly make significant contribution if divided between the previous 24 samples.

Persistent organic pollutants

Stórhöfði 1996 - Precipitation - POPs concentrations * - ng/l

period no.	alpha HCH	beta HCH	gamma HCH	o,p'-DDE	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	HCB	trans CD	cis CD	trans NO	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180
1	0.39	0	0.29	0	0.02	0.05	0.04	0.16	0.01	0	0.004	0	0.05	0.04	0	0.02	0.08	0.05	0.11	0.16	0.20	0.02	0.06
2	0.34	0.02	0.15	0	0.02	0.01	0	0.07	0.01	0.01	0.01	0	0.04	0.05	0	0.03	0.10	0.05	0.10	0.24	0.24	0.02	0.10
3	0.35	0	0.07	0	0.03	0.10	0.03	0.37	0.01	0.02	0.01	0	0.03	0.04	0.02	0.03	0.03	0.01	0.03	0.07	0.07	0.01	0.03
4	0.80	0.02	0.20	0	0.01	0.01	0.03	0	0.02	0.01	0.01	0	0.04	0	0	0.03	0.14	0.06	0.16	0.19	0.18	0.02	0.10
5	0.69	0	0.50	0	0.01	0.05	0.02	0.16	0.01	0.02	0.01	0	0.04	0.05	0	0.08	0.05	0.02	0.04	0.06	0.06	0.01	0.04
6	1.63	0.17	2.60	0	0.07	0	0.20	0	0.10	0.03	0	0.03	0	0	0	0	0.37	0.13	0.13	0.73	0.63	0.07	0.37
7	0.59	0	0.58	0	0.01	0.04	0.04	0.06	0.01	0	0.01	0	0.04	0	0	0	0.06	0.04	0.03	0.12	0.11	0.01	0.06
8	0.60	0	0.81	0	0	0	0.08	0	0.02	0.01	0	0.01	0.06	0	0	0.06	0.10	0.06	0.07	0.27	0.23	0.02	0.22
9	0.40	0	0.22	0	0.02	0.03	0.03	0.08	0.01	0.02	0.004	0.01	0.02	0	0	0.02	0.04	0.03	0.04	0.10	0.09	0.01	0.10
10	0.31	0	1.39	0	0.04	0.16	0.05	0.58	0.01	0.01	0	0	0.05	0.35	0.44	0.15	0.06	0.04	0.04	0.16	0.14	0.02	0.23
11	0.14	0	0.57	0	0.01	0.02	0.01	0.08	0.01	0.003	0	0.003	0.02	0.06	0.06	0.03	0.01	0.01	0.01	0.05	0.05	0.01	0.03
12	0.31	0	0.23	0	0.03	0.06	0.06	0.20	0.01	0.01	0.01	0.03	0.08	0.18	0.15	0.07	0.20	0.07	0.15	0.24	0.27	0.07	0.12
13	0.26	0	0.16	0	0.01	0.03	0.03	0.06	0.01	0.004	0.004	0.01	0.02	0.14	0.11	0.04	0.09	0.05	0.07	0.13	0.14	0.05	0.08
14	0.23	0	0.10	0	0	0	0.01	0	0.01	0	0	0	0.02	0.04	0.03	0.03	0.01	0	0.01	0.004	0.02	0	0.01
15	0.30	0	0.14	0	0.01	0	0.01	0.01	0.02	0	0	0	0.02	0	0	0.01	0.03	0	0.03	0	0.03	0	0.02
16	0.38	0	0.11	0	0	0	0	0.03	0.02	0	0	0	0.02	0	0	0.003	0	0	0.003	0	0.01	0	0.01
17	0.17	0	0.14	0	0	0	0.01	0.05	0.003	0	0	0	0.01	0.03	0.06	0.02	0	0	0	0	0.003	0	0.01
18	0.21	0	0.08	0	0.01	0	0.02	0.06	0.01	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0
19	0.54	0	0.29	0	0	0.02	0.03	0.22	0.02	0	0	0	0.05	0.01	0.03	0.26	0.2	0	0.13	0.04	0.09	0	0.02
20	0.41	0	0.22	0	0.01	0.02	0.03	0.32	0.01	0	0	0	0.03	0.11	0.11	0.03	0.01	0	0.002	0.01	0.01	0	0.01
21	1.05	0	0.45	0	0	0	0.09	0.09	0.02	0	0	0	0.06	0.11	0.11	0.03	0.01	0	0	0	0	0	0
22	0.62	0	0.35	0	0	0	0.04	0.02	0.03	0	0	0	0.07	1.99	2.09	0.51	0.02	0	0.01	0	0.04	0	0.01
23	0.36	0	0.10	0	0	0.03	0.06	1.27	0.01	0	0	0	0.06	0.32	0.41	0.09	0	0	0.003	0	0.003	0	0.003
24	0.39	0	0.22	0	0	0	0	0.05	0.01	0	0	0	0.05	1.01	1.00	0.27	0.03	0	0.02	0	0.01	0	0
wt.mean	0.40	0.002	0.27	0	0.01	0.03	0.03	0.16	0.01	0.005	0.003	0.002	0.03	0.16	0.16	0.07	0.04	0.02	0.04	0.06	0.07	0.01	0.04

wt.mean	all HCHs = 0.67	all DDTs = 0.23	** 7 PCBs = 0.48
0.66	: wt.mean gamma-HCH / wt.mean alpha-HCH		

* Concentration derived using precipitation quantity as measured in sampling equipment.

** Combined concentration of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

wt.mean: Annual weighted mean concentration (see text).

Persistent organic pollutants

Stórhöfði 1996 - Precipitation - POPs depositions * - ng/m2

period no.	alpha HCH	beta HCH	gamma HCH	o,p'-DDE	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	HCB	trans CD	cis CD	trans NO	Diel-drin	PCB -28	PCB -31	PCB -52	PCB -101	PCB -105	PCB -118	PCB -138	PCB -153	PCB -156	PCB -180	* 7 PCB	** 3 PCB
1	19.3	0	14.0	0	1.1	2.3	1.8	7.7	0.7	0	0.2	0	2.3	1.8	0	1.1	3.9	2.5	5.6	8.1	10.0	0.9	3.0	33.3	3.3
2	16.5	1.1	7.2	0	1.0	0.6	0	3.4	0.6	0.5	0.6	0	1.8	2.6	0	1.3	4.8	2.6	4.8	11.4	11.7	1.1	5.0	41.4	3.7
3	39.3	0	8.2	0	3.2	11.1	2.9	42.1	1.3	1.8	0.6	0	3.9	4.2	2.7	3.9	3.5	1.1	3.4	8.5	8.0	1.0	3.7	35.2	4.8
4	48.8	1.3	12.4	0	0.8	0.4	1.9	0	1.1	0.6	0.4	0	2.7	0	0	2.1	8.8	3.6	9.9	11.8	10.9	1.3	5.9	49.4	4.8
5	63.0	0	45.7	0	1.2	4.4	1.9	14.9	1.2	2.1	0.7	0	3.3	4.7	0	7.5	4.2	1.9	3.3	5.8	5.6	0.9	3.7	34.8	2.8
6	6.5	0.7	10.4	0	0.3	0	0.8	0	0.4	0.1	0	0.1	0	0	0	0	1.5	0.5	0.5	2.9	2.5	0.3	1.5	8.9	0.8
7	31.5	0	30.9	0	0.6	2.1	2.1	2.9	0.6	0	0.6	0	2.4	0	0	0	2.9	2.1	1.5	6.5	5.9	0.6	2.9	19.7	2.7
8	9.6	0	13.0	0	0	0	1.2	0	0.4	0.2	0	0.2	0.9	0	0	0.9	1.6	0.9	1.1	4.3	3.7	0.4	3.6	15.1	1.2
9	21.0	0	11.4	0	0.8	1.7	1.5	4.2	0.4	0.8	0.2	0.4	1.3	0	0	0.8	2.1	1.7	2.1	5.3	4.9	0.4	5.1	20.4	2.1
10	10.3	0	45.8	0	1.2	5.2	1.6	19.0	0.4	0.2	0	0	1.7	11.5	14.4	5.0	1.9	1.2	1.2	5.2	4.7	0.6	7.6	37.1	16.1
11	8.6	0	34.8	0	0.5	1.2	0.8	4.8	0.3	0.2	0	0.2	1.2	3.5	3.5	1.8	0.8	0.8	0.8	3.1	2.8	0.3	2.0	14.8	4.6
12	10.7	0	7.9	0	1.1	2.0	2.0	6.8	0.2	0.2	0.5	1.1	2.7	6.1	5.0	2.5	6.8	2.3	5.0	8.2	9.3	2.3	4.1	41.9	9.5
13	17.4	0	10.7	0	0.7	2.2	2.0	4.2	0.5	0.2	0.2	0.5	1.5	9.2	7.4	2.5	6.0	3.5	4.7	8.9	9.2	3.5	5.5	45.9	14.4
14	21.7	0	9.3	0	0	0	0.7	0	1.3	0	0	0	2.2	3.5	3.3	3.1	0.7	0	0.5	0.4	1.5	0	0.7	10.4	3.3
15	18.4	0	8.5	0	0.8	0	0.6	0.8	1.0	0	0	0	1.4	0	0	0.4	1.9	0	1.7	0	1.9	0	1.2	7.2	0
16	25.6	0	7.4	0	0	0	0	2.1	1.2	0	0	0	1.0	0	0	0.2	0	0	0.2	0	0.6	0	0.4	1.4	0
17	13.5	0	11.1	0	0	0	1.1	3.8	0.2	0	0	0	1.1	2.7	4.5	1.8	0	0	0	0	0.2	0	0.5	5.2	4.5
18	25.2	0	10.3	0	0.8	0	2.5	7.4	0.6	0	0	0	2.3	0	0	0	0	0	0	0	0	0	0	0	0
19	23.5	0	12.5	0	0	0.7	1.1	9.7	0.9	0	0	0	2.2	0.2	1.1	11.4	8.8	0	5.7	1.5	4.0	0	0.7	32.3	1.1
20	43.0	0	23.1	0	1.1	2.5	3.1	33.4	1.5	0	0	0	3.4	11.3	12.0	3.6	0.8	0	0.2	1.0	1.3	0	0.6	18.7	12.0
21	38.7	0	16.7	0	0	0	3.1	3.1	0.7	0	0	0	2.0	4.1	3.9	0.9	0.2	0	0	0	0	0	0	5.2	3.9
22	38.3	0	21.7	0	0	0	2.3	1.1	2.0	0	0	0	4.5	123.2	129.6	31.6	1.4	0	0.8	0	2.3	0	0.6	160	130
23	18.0	0	5.0	0	0	1.3	2.8	63.7	0.3	0	0	0	3.0	16.0	20.3	4.5	0	0	0.2	0	0.2	0	0.2	21.0	20.3
24	11.0	0	6.0	0	0	0	0	1.5	0.2	0	0	0	1.3	28.2	28.0	7.5	0.9	0	0.4	0	0.2	0	0	37.3	28.0
sum	579	3.0	384	0	15.2	37.7	37.7	237	18.1	7.0	4.1	2.5	50	232	236	94.4	63.6	24.5	53.7	92.8	101	13.4	58.1		
periods 1 - 9	all HCHs = 412			all DDTs = 121										** 7 PCBs = 258											

* Deposition derived using precipitation quantity as measured in a standard WMO gauge at the station.

** Sum deposition of seven commonly analysed PCB congeners: PCB -28, -52, -101, -118, -138, -153 and -180.

*** Sum deposition of three additional PCB congeners: PCB -31, -105 and -156.

sum : Annual sum deposition.

periods 1 - 9 : Sum of depositions in the later half of winter season 1995 - 1996 (see Appendix D, p. D2).

Heavy metals in precipitation: Concentrations and annual weighted mean concentrations

1992		Precip. mm	Cd µg/l	# As µg/l	Cr µg/l	Cu µg/l	Ni µg/l	Pb µg/l	Zn µg/l
ICELAND									
Írafoss	Sum	2067.2							
	Mean		0.16	0	0.33	5.75	0.07	1.93	247.50
Wet only	Min		0	0	0	0.40	0	0	7.80
Monthly	Max		0.94	0	1.10	32.50	0.70	7.30	1800.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
04/01/92 - 03/02/92	January	361.5	0 (<dl)	0 (<dl)	0.3	3.4	0 (<dl)	0.8	17.5
04/02/92 - 02/03/92	February	236.2	0.94	0 (<dl)	0.8	32.5 high	0 (<dl)	7.3 high	1800 high
03/03/92 - 02/04/92	March	178.3	0.17	0 (<dl)	0 (<dl)	1.1	0 (<dl)	0 (<dl)	14
03/04/92 - 04/05/92	April	85.9	0 (<dl)	0 (<dl)	0 (<dl)	1.0	0 (<dl)	0 (<dl)	7.8
05/05/92 - 02/06/92	May	127.0	0.05	0 (<dl)	0.3	1.7	0 (<dl)	1.1	8.8
03/06/92 - 01/07/92	June	209.9	0.09	0 (<dl)	0 (<dl)	0.9	0 (<dl)	0 (<dl)	9.8
02/07/92 - 05/08/92	July	102.9	0 (<dl)	0 (<dl)	0.3	0.9	0 (<dl)	0.6	8
06/08/92 - 01/09/92	August	123.2	0 (<dl)	0 (<dl)	1.1	1.3	0.7	0 (<dl)	10
02/09/92 - 01/10/92	September	78.7	0 (<dl)	0 (<dl)	0.4	3.4	0 (<dl)	0 (<dl)	14
02/10/92 - 02/11/92	October	127.2	0 (<dl)	0 (<dl)	0.5	0.6	0.5	0 (<dl)	34
03/11/92 - 03/12/92	November	176.7	0.08	0 (<dl)	0.2	0.4	0 (<dl)	0 (<dl)	30
04/12/92 - 31/12/92	December	259.7	0.12	0 (<dl)	0.2	6.3	0 (<dl)	6.8 high	235 high
ICELAND									
Reykjavík 11 months:	Sum	872.9							
	Mean		0.03	0	0.35	2.06	0.61	0.59	184.75
Bulk	Min		0	0	0	0.70	0	0	83.00
Monthly	Max		0.10	0	1.10	5.20	1.50	3.80	370.00
	n		11	11	11	11	11	11	11
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
(not analysed)	January	(129.7)							
04/02/92 - 02/03/92	February	115.9	0.05	0 (<dl)	1.1	4.3	1.2	3.8 high	160
03/03/92 - 02/04/92	March	116.2	0 (<dl)	0 (<dl)	0.1	1.4	0 (<dl)	0 (<dl)	178
03/04/92 - 04/05/92	April	44.6	0 (<dl)	0 (<dl)	0.4	5.2	1.5	0 (<dl)	351
05/05/92 - 02/06/92	May	82.9	0.10	0 (<dl)	0.5	3.4	1.2	0.7	370
03/06/92 - 01/07/92	June	66.2	0.06	0 (<dl)	0.2	1.7	0.8	0 (<dl)	200
02/07/92 - 05/08/92	July	37.8	0 (<dl)	0 (<dl)	0.6	2.7	1.0	0.5	176
06/08/92 - 01/09/92	August	36.2	0 (<dl)	0 (<dl)	0.7	1.5	0.7	0 (<dl)	261
02/09/92 - 01/10/92	September	56.9	0 (<dl)	0 (<dl)	0.4	1.3	1.2	0 (<dl)	175
02/10/92 - 02/11/92	October	68.1	0 (<dl)	0 (<dl)	0.1	1.2	0.6	0 (<dl)	169
03/11/92 - 03/12/92	November	113.4	0.06	0 (<dl)	0 (<dl)	0.7	0 (<dl)	0 (<dl)	121
04/12/92 - 31/12/92	December	134.7	0 (<dl)	0 (<dl)	0.1	0.9	0 (<dl)	0 (<dl)	83

As results are possibly too low (see Appendix A)

Sum: Amount of annual precipitation
Mean: Annual weighted mean concentration
Min: Lowest monthly concentration
Max: Highest monthly concentration
n: Number of months
dl: Detection limit

Heavy metals in precipitation: Monthly and annual depositions

		1992	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
ICELAND									
Írafoss		JAN	0.00	0.00	108.45	1229.10	0.00	289.20	6326.25
		FEB	222.03	0.00	188.96	7676.50	0.00	1724.26	425160.00
		MAR	30.31	0.00	0.00	196.13	0.00	0.00	2496.20
		APR	0.00	0.00	0.00	85.90	0.00	0.00	670.02
		MAY	6.35	0.00	38.10	215.90	0.00	139.70	1117.60
		JUN	18.89	0.00	0.00	188.91	0.00	0.00	2057.02
		JUL	0.00	0.00	30.87	92.61	0.00	61.74	823.20
		AUG	0.00	0.00	135.52	160.16	86.24	0.00	1232.00
		SEP	0.00	0.00	31.48	267.58	0.00	0.00	1101.80
		OCT	0.00	0.00	63.60	76.32	63.60	0.00	4324.80
		NOV	14.14	0.00	35.34	70.68	0.00	0.00	5301.00
		DEC	31.16	0.00	51.94	1636.11	0.00	1765.96	61029.50
		TOTAL	322.88	0.00	684.26	11895.90	149.84	3980.86	511639.39

		1992	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
ICELAND									
Reykjavík	not analysed	JAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		FEB	5.80	0.00	127.49	498.37	139.08	440.42	18544.00
		MAR	0.00	0.00	11.62	162.68	0.00	0.00	20683.60
		APR	0.00	0.00	17.84	231.92	66.90	0.00	15654.60
		MAY	8.29	0.00	41.45	281.86	99.48	58.03	30673.00
		JUN	3.97	0.00	13.24	112.54	52.96	0.00	13240.00
		JUL	0.00	0.00	22.68	102.06	37.80	18.90	6652.80
		AUG	0.00	0.00	25.34	54.30	25.34	0.00	9448.20
		SEP	0.00	0.00	22.76	73.97	68.28	0.00	9957.50
		OCT	0.00	0.00	6.81	81.72	40.86	0.00	11508.90
		NOV	6.80	0.00	0.00	79.38	0.00	0.00	13721.40
		DEC	0.00	0.00	13.47	121.23	0.00	0.00	11180.10
	(11 months)	TOTAL	24.86	0.00	302.70	1800.03	530.70	517.35	161264.10

Heavy metals in precipitation: Concentrations and annual weighted mean concentrations

	1993	Precip. mm	Cd µg/l	# As µg/l	Cr µg/l	Cu µg/l	Ni µg/l	Pb µg/l	Zn µg/l
ICELAND									
Írafoss	Sum	2202.7							
	Mean		0.05	0	0.40	1.90	0.29	0.76	28.89
Wet only	Min		0	0	0	0.40	0	0	2.00
Monthly	Max		0.10	0	1.20	3.50	0.90	2.10	80.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
01/01/93 - 04/02/93	January	199.7	0 (<dl)	0 (<dl)	0 (<dl)	0.7	0 (<dl)	0 (<dl)	39
05/02/93 - 01/03/93	February	180.5	0.07	0 (<dl)	0 (<dl)	3.2	0 (<dl)	0.5	13
02/03/93 - 01/04/93	March	229.8	0 (<dl)	0 (<dl)	0 (<dl)	0.9	0 (<dl)	0 (<dl)	13
02/04/93 - 04/05/93	April	143.7	0.06	0 (<dl)	1.2	0.8	0.6	0 (<dl)	14
05/05/93 - 01/06/93	May	183.6	0.07	0 (<dl)	1.0	3.5	0.5	0.8	2
02/06/93 - 01/07/93	June	138.7	0 (<dl)	0 (<dl)	0.6	0.4	0.6	0 (<dl)	19
02/07/93 - 03/08/93	July	19.6	0 (<dl)	0 (<dl)	0.8	0.6	0.8	0 (<dl)	25
04/08/93 - 01/09/93	August	177.0	0 (<dl)	0 (<dl)	0.9	0.4	0.8	0 (<dl)	8
02/09/93 - 01/10/93	September	242.4	0.09	0 (<dl)	0.9	3.3	0.9	2.1	80
02/10/93 - 01/11/93	October	235.3	0.08	0 (<dl)	0.2	2.8	0 (<dl)	1.8	42
02/11/93 - 01/12/93	November	392.8	0.10	0 (<dl)	0 (<dl)	2.2	0 (<dl)	1.3	32
02/12/93 - 03/01/94	December	59.6	0.08	0 (<dl)	0 (<dl)	0.6	0 (<dl)	0 (<dl)	30
ICELAND									
Reykjavík	Sum	936.4							
	Mean		0.01	0	0.23	1.67	0.45	0	162.28
Bulk	Min		0	0	0	1.00	0	0	71.00
Monthly	Max		0.05	0	1.10	2.80	1.50	0	338.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
01/01/93 - 04/02/93	January	90.4	0 (<dl)	0 (<dl)	0.3	1.4	0.7	0 (<dl)	186
05/02/93 - 01/03/93	February	84.4	0 (<dl)	0 (<dl)	0.1	1.2	0 (<dl)	0 (<dl)	116
02/03/93 - 01/04/93	March	93.2	0 (<dl)	0 (<dl)	0 (<dl)	1.2	0 (<dl)	0 (<dl)	128
02/04/93 - 04/05/93	April	55.9	0 (<dl)	0 (<dl)	0 (<dl)	1.6	0.8	0 (<dl)	199
05/05/93 - 01/06/93	May	42.3	0 (<dl)	0 (<dl)	0.2	1.1	0.8	0 (<dl)	160
02/06/93 - 01/07/93	June	38.7	0 (<dl)	0 (<dl)	0.8	1.5	1.3	0 (<dl)	250
02/07/93 - 03/08/93	July	23.5	0 (<dl)	0 (<dl)	0.3	2.6	1.5	0 (<dl)	280
04/08/93 - 01/09/93	August	59.6	0 (<dl)	0 (<dl)	0.6	1.5	1.1	0 (<dl)	250
02/09/93 - 01/10/93	September	81.4	0 (<dl)	0 (<dl)	1.1	1.9	1.1	0 (<dl)	230
02/10/93 - 01/11/93	October	41.4	0 (<dl)	0 (<dl)	0.1	2.8	1.0	0 (<dl)	338
02/11/93 - 01/12/93	November	258.8	0.05	0 (<dl)	0 (<dl)	2.1	0 (<dl)	0 (<dl)	104
02/12/93 - 03/01/94	December	66.8	0 (<dl)	0 (<dl)	0.1	1.0	0 (<dl)	0 (<dl)	71

\# As results are possibly too low (see Appendix A)

Sum: Amount of annual precipitation
Mean: Annual weighted mean concentration
Min: Lowest monthly concentration
Max: Highest monthly concentration
n: Number of months
dl: Detection limit

Heavy metals in precipitation: Monthly and annual depositions

ICELAND Írafoss	1993	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
	JAN	0.00	0.00	0.00	139.79	0.00	0.00	7788.30
	FEB	12.64	0.00	0.00	577.60	0.00	90.25	2346.50
	MAR	0.00	0.00	0.00	206.82	0.00	0.00	2987.40
	APR	8.62	0.00	172.44	114.96	86.22	0.00	2011.80
	MAY	12.85	0.00	183.60	642.60	91.80	146.88	367.20
	JUN	0.00	0.00	83.22	55.48	83.22	0.00	2635.30
	JUL	0.00	0.00	15.68	11.76	15.68	0.00	490.00
	AUG	0.00	0.00	159.30	70.80	141.60	0.00	1416.00
	SEP	21.82	0.00	218.16	799.92	218.16	509.04	19392.00
	OCT	18.82	0.00	47.06	658.84	0.00	423.54	9882.60
	NOV	39.28	0.00	0.00	864.16	0.00	510.64	12569.60
	DEC	4.77	0.00	0.00	35.76	0.00	0.00	1758.20
	TOTAL	118.80	0.00	879.46	4178.49	636.68	1680.35	63644.90

ICELAND Reykjavík	1993	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
	JAN	0.00	0.00	27.12	126.56	63.28	0.00	16814.40
	FEB	0.00	0.00	8.44	101.28	0.00	0.00	9790.40
	MAR	0.00	0.00	0.00	111.84	0.00	0.00	11929.60
	APR	0.00	0.00	0.00	89.44	44.72	0.00	11124.10
	MAY	0.00	0.00	8.46	46.53	33.84	0.00	6768.00
	JUN	0.00	0.00	30.96	58.05	50.31	0.00	9675.00
	JUL	0.00	0.00	7.05	61.10	35.25	0.00	6580.00
	AUG	0.00	0.00	35.76	89.40	65.56	0.00	14900.00
	SEP	0.00	0.00	89.54	154.66	89.54	0.00	18722.00
	OCT	0.00	0.00	4.14	115.92	41.40	0.00	13993.20
	NOV	12.94	0.00	0.00	543.48	0.00	0.00	26915.20
	DEC	0.00	0.00	6.68	66.80	0.00	0.00	4742.80
	TOTAL	12.94	0.00	218.15	1565.06	423.90	0.00	151954.70

Heavy metals in precipitation: Concentrations and annual weighted mean concentrations

1994		Precip. mm	Cd µg/l	# As µg/l	Cr µg/l	Cu µg/l	Ni µg/l	Pb µg/l	Zn µg/l
ICELAND									
Írafoss	Sum	1691.8							
	Mean		0.65	0	0.03	3.65	0.39	0.41	469.05
Wet only	Min		0	0	0	0.70	0	0	3.00
Monthly	Max		5.40	0	0.40	33.00	8.00	3.60	7030.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
04/01/94 - 04/02/94	January	169.3	0.68	0 (<dl)	0 (<dl)	0.7	0 (<dl)	0 (<dl)	32
05/02/94 - 01/03/94	February	157.4	0.40	0 (<dl)	0 (<dl)	0.8	0 (<dl)	0 (<dl)	28
02/03/94 - 06/04/94	March	186.2	0.32	0 (<dl)	0 (<dl)	0.8	0 (<dl)	0 (<dl)	25
07/04/94 - 03/05/94	April	73.0	5.4 high	0 (<dl)	0.4	33 high	0.7	3.6	7030 high
04/05/94 - 02/06/94	May	75.1	0.91	0 (<dl)	0 (<dl)	16 high	8.0	0.7	38
03/06/94 - 05/07/94	June	131.1	0.09	0 (<dl)	0 (<dl)	3.4	0 (<dl)	0 (<dl)	8
06/07/94 - 03/08/94	July	113.7	3.0 high	0 (<dl)	0 (<dl)	5.6	0 (<dl)	3.3	2230 high
04/08/94 - 31/08/94	August	44.4	0.08	0 (<dl)	0 (<dl)	3.8	0 (<dl)	0 (<dl)	3
01/09/94 - 03/10/94	September	135.6	0 (<dl)	0 (<dl)	0 (<dl)	1.0	0 (<dl)	0 (<dl)	11
04/10/94 - 01/11/94	October	125.6	0 (<dl)	0 (<dl)	0 (<dl)	1.9	0 (<dl)	0 (<dl)	6
02/11/94 - 30/11/94	November	193.9	0.12	0 (<dl)	0.1	1.3	0 (<dl)	0 (<dl)	6
01/12/94 - 09/01/95	December	286.5	0.09	0 (<dl)	0 (<dl)	1.0	0 (<dl)	0 (<dl)	17
ICELAND									
Reykjavík	Sum	770.6							
	Mean		0.03	0	0.05	2.58	0.27	0.19	158.74
Bulk	Min		0	0	0	0.70	0	0	80.00
Monthly	Max		0.31	0	0.10	11.00	0.90	1.60	500.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
04/01/94 - 04/02/94	January	64.2	0 (<dl)	0 (<dl)	0 (<dl)	1.7	0.6	0 (<dl)	120
05/02/94 - 01/03/94	February	117.8	0 (<dl)	0 (<dl)	0.1	0.7	0 (<dl)	0 (<dl)	85
02/03/94 - 06/04/94	March	81.3	0 (<dl)	0 (<dl)	0.1	1.4	0 (<dl)	0 (<dl)	160
07/04/94 - 03/05/94	April	29.0	0.05	0 (<dl)	0 (<dl)	1.9	0.6	0 (<dl)	150
04/05/94 - 02/06/94	May	65.6	0.06	0 (<dl)	0 (<dl)	1.5	0.5	0 (<dl)	190
03/06/94 - 05/07/94	June	46.1	0 (<dl)	0 (<dl)	0 (<dl)	1.1	0 (<dl)	0 (<dl)	130
06/07/94 - 03/08/94	July	55.3	0 (<dl)	0 (<dl)	0 (<dl)	1.5	0.9	0 (<dl)	200
04/08/94 - 31/08/94	August	27.1	0.31 high	0 (<dl)	0.1	11 high	0.8	1.6	500 high
01/09/94 - 03/10/94	September	43.5	0.11	0 (<dl)	0 (<dl)	5.7	0.5	0.6	270
04/10/94 - 01/11/94	October	54.3	0.09	0 (<dl)	0 (<dl)	7.1	0.5	1.4	230
02/11/94 - 30/11/94	November	72.0	0 (<dl)	0 (<dl)	0.1	3.4	0 (<dl)	0 (<dl)	150
01/12/94 - 09/01/95	December	114.4	0 (<dl)	0 (<dl)	0.1	1.9	0 (<dl)	0 (<dl)	80

\# As results are possibly too low (see Appendix A)

Sum: Amount of annual precipitation
Mean: Annual weighted mean concentration
Min: Lowest monthly concentration
Max: Highest monthly concentration
n: Number of months
dl: Detection limit

Heavy metals in precipitation: Monthly and annual depositions

ICELAND Írafoss	1994	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
	JAN	115.12	0.00	0.00	118.51	0.00	0.00	5417.60
	FEB	62.96	0.00	0.00	125.92	0.00	0.00	4407.20
	MAR	59.58	0.00	0.00	148.96	0.00	0.00	4655.00
	APR	394.20	0.00	29.20	2409.00	51.10	262.80	513190.00
	MAY	68.34	0.00	0.00	1201.60	600.80	52.57	2853.80
	JUN	11.80	0.00	0.00	445.74	0.00	0.00	1048.80
	JUL	341.10	0.00	0.00	636.72	0.00	375.21	253551.00
	AUG	3.55	0.00	0.00	168.72	0.00	0.00	133.20
	SEP	0.00	0.00	0.00	135.60	0.00	0.00	1491.60
	OCT	0.00	0.00	0.00	238.64	0.00	0.00	753.60
	NOV	23.27	0.00	19.39	252.07	0.00	0.00	1163.40
	DEC	25.79	0.00	0.00	286.50	0.00	0.00	4870.50
	TOTAL	1105.71	0.00	48.59	6167.98	651.90	690.58	793535.70

ICELAND Reykjavík	1994	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
	JAN	0.00	0.00	0.00	109.14	38.52	0.00	7704.00
	FEB	0.00	0.00	11.78	82.46	0.00	0.00	10013.00
	MAR	0.00	0.00	8.13	113.82	0.00	0.00	13008.00
	APR	1.45	0.00	0.00	55.10	17.40	0.00	4350.00
	MAY	3.94	0.00	0.00	98.40	32.80	0.00	12464.00
	JUN	0.00	0.00	0.00	50.71	0.00	0.00	5993.00
	JUL	0.00	0.00	0.00	82.95	49.77	0.00	11060.00
	AUG	8.40	0.00	2.71	298.10	21.68	43.36	13550.00
	SEP	4.79	0.00	0.00	247.95	21.75	26.10	11745.00
	OCT	4.89	0.00	0.00	385.53	27.15	76.02	12489.00
	NOV	0.00	0.00	7.20	244.80	0.00	0.00	10800.00
	DEC	0.00	0.00	11.44	217.36	0.00	0.00	9152.00
	TOTAL	23.46	0.00	41.26	1986.32	209.07	145.48	122328.00

Heavy metals in precipitation: Concentrations and annual weighted mean concentrations

	1995	Precip. mm	Cd µg/l	# As µg/l	Cr µg/l	Cu µg/l	Ni µg/l	Pb µg/l	Zn µg/l
ICELAND									
Írafoss	Sum	1498.7							
	Mean		12.09	0	0.06	4.45	7.42	1.38	28.56
Wet only	Min		0.11	0	0	1.10	0	0	6.00
Monthly	Max		48.00	0	0.20	12.70	53.00	5.20	86.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
10/01/95 - 06/02/95	January	52.9	0.12	0 (<dl)	0 (<dl)	1.1	0 (<dl)	1.0	8
07/02/95 - 06/03/95	February	19.6	0.32	0 (<dl)	0 (<dl)	1.6	0 (<dl)	0 (<dl)	60
07/03/95 - 03/04/95	March	160.9	0.11	0 (<dl)	0 (<dl)	1.1	0 (<dl)	0 (<dl)	6
04/04/95 - 02/05/95	April	104.7	0.22	0 (<dl)	0 (<dl)	12.7 high	1.1	0.8	40
03/05/95 - 01/06/95	May	21.0	0.67	0 (<dl)	0 (<dl)	6.7	1.2	0 (<dl)	30
02/06/95 - 01/07/95	June	106.8	0.37	0 (<dl)	0 (<dl)	3.9	6.3	0 (<dl)	16
02/07/95 - 08/08/95	July	167.3	0.31	0 (<dl)	0 (<dl)	3.8	25.5 high	0 (<dl)	18
09/08/95 - 04/09/95	August	230.9	0.22	0 (<dl)	0 (<dl)	3.1	3.9	0 (<dl)	9
05/09/95 - 11/10/95	September	154.5	0.35	0 (<dl)	0.1	3.2	4.4	0 (<dl)	9
12/10/95 - 01/11/95	October	75.6	0.13	0 (<dl)	0.1	1.7	3.9	0 (<dl)	13
02/11/95 - 01/12/95	1-20 Nov.*	33.0	0.32	0 (<dl)	0 (<dl)	1.8	53 high	0 (<dl)	86
02/12/95 - 03/01/96	13-31 Dec.*	371.5	48 high	0 (<dl)	0.2	6.7	6.5	5.2 high	63
ICELAND									
Reykjavík	Sum	590.0							
	Mean		0.01	0	0.14	2.92	0.96	0.70	184.91
Bulk	Min		0	0	0	1.80	0	0	84.00
Monthly	Max		0.08	0	0.40	5.20	6.50	3.20	310.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
10/01/95 - 06/02/95	January	38.3	0.05	0 (<dl)	0.2	3.3	0 (<dl)	1.5	130
07/02/95 - 06/03/95	February	14.1	0.06	0 (<dl)	0.2	2.6	1.5	0.9	130
07/03/95 - 03/04/95	March	40.8	0.07	0 (<dl)	0 (<dl)	3.2	1.5	0.6	220
04/04/95 - 02/05/95	April	31.8	0 (<dl)	0 (<dl)	0 (<dl)	3.2	0.8	0 (<dl)	220
03/05/95 - 01/06/95	May	16.5	0 (<dl)	0 (<dl)	0.2	5.2	1.2	0.7	310
02/06/95 - 01/07/95	June	38.4	0.08	0 (<dl)	0.4	3.0	6.5 high	3.2 high	290
02/07/95 - 08/08/95	July	76.9	0 (<dl)	0 (<dl)	0.2	2.7	0.6	0.8	200
09/08/95 - 04/09/95	August	71.0	0 (<dl)	0 (<dl)	0.2	1.9	0 (<dl)	0.6	200
03/09/95 - 11/10/95	September	68.8	0 (<dl)	0 (<dl)	0.2	5.0	0.8	0.8	240
12/10/95 - 01/11/95	October	40.7	0 (<dl)	0 (<dl)	0.2	3.5	0.5	0.6	190
02/11/95 - 01/12/95	November	17.4	0 (<dl)	0 (<dl)	0.1	3.1	0.9	0 (<dl)	280
02/12/95 - 03/01/96	December	135.3	0 (<dl)	0 (<dl)	0 (<dl)	1.8	0.4	0 (<dl)	84

As results are possibly too low (see Appendix A)

Sum: Amount of annual precipitation
Mean: Annual weighted mean concentration
Min: Lowest monthly concentration
Max: Highest monthly concentration
n: Number of months
dl: Detection limit

* Equipment repaired 20/11 - 13/12. Even so, precipitation quantity is for the whole monthly period.

Heavy metals in precipitation: Monthly and annual depositions

ICELAND
Írafoss

1995	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
JAN	6.35	0.00	0.00	58.19	0.00	52.90	423.20
FEB	6.27	0.00	0.00	31.36	0.00	0.00	1176.00
MAR	17.70	0.00	0.00	176.99	0.00	0.00	965.40
APR	23.03	0.00	0.00	1329.69	115.17	83.76	4188.00
MAY	14.07	0.00	0.00	140.70	25.20	0.00	630.00
JUN	39.52	0.00	0.00	416.52	672.84	0.00	1708.80
JUL	51.86	0.00	0.00	635.74	4266.15	0.00	3011.40
AUG	50.80	0.00	0.00	715.79	900.51	0.00	2078.10
SEP	54.08	0.00	15.45	494.40	679.80	0.00	1390.50
OCT	9.83	0.00	7.56	128.52	294.84	0.00	982.80
NOV	10.56	0.00	0.00	59.40	1749.00	0.00	2838.00
DEC	17832.00	0.00	74.30	2489.05	2414.75	1931.80	23404.50
TOTAL	18116.06	0.00	97.31	6676.35	11118.26	2068.46	42796.70

ICELAND
Reykjavík

1995	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
JAN	1.92	0.00	7.66	126.39	0.00	57.45	4979.00
FEB	0.85	0.00	2.82	36.66	21.15	12.69	1833.00
MAR	2.86	0.00	0.00	130.56	61.20	24.48	8976.00
APR	0.00	0.00	0.00	101.76	25.44	0.00	6996.00
MAY	0.00	0.00	3.30	85.80	19.80	11.55	5115.00
JUN	3.07	0.00	15.36	115.20	249.60	122.88	11136.00
JUL	0.00	0.00	15.38	207.63	46.14	61.52	15380.00
AUG	0.00	0.00	14.20	134.90	0.00	42.60	14200.00
SEP	0.00	0.00	13.76	344.00	55.04	55.04	16512.00
OCT	0.00	0.00	8.14	142.45	20.35	24.42	7733.00
NOV	0.00	0.00	1.74	53.94	15.66	0.00	4872.00
DEC	0.00	0.00	0.00	243.54	54.12	0.00	11365.20
TOTAL	8.69	0.00	82.36	1722.83	568.50	412.63	109097.20

Heavy metals in precipitation: Concentrations and annual weighted mean concentrations

	1996	Precip. mm	Cd µg/l	# As µg/l	Cr µg/l	Cu µg/l	Ni µg/l	Pb µg/l	Zn µg/l
ICELAND									
Írafoss	Sum	1843.9							
	Mean		0.91	0	0.15	1.54	1.02	0.81	16.46
Wet only	Min		0	0	0	0.30	0	0	5.00
Monthly	Max		9.60	0	0.60	5.10	5.90	2.90	56.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
04/01/96 - 01/02/96	January	146.5	9.6 high	0 (<dl)	0.1	1.9	1.0	1.0	14
02/02/96 - 01/03/96	February	208.2	0.29	0 (<dl)	0.2	3.7	0.8	1.8	34
02/03/96 - 01/04/96	March	169.0	0.27	0 (<dl)	0.2	1.6	0.5	1.5	22
02/04/96 - 02/05/96	April	121.4	0.08	0 (<dl)	0.4	0.8	3.8	0 (<dl)	25
03/05/96 - 03/06/96	May	165.4	0.06	0 (<dl)	0.6	0.9	1.0	0 (<dl)	19
04/06/96 - 01/07/96	June	130.5	0.05	0 (<dl)	0.3	0.5	1.1	0 (<dl)	9
02/07/96 - 01/08/96	July	152.5	0 (<dl)	0 (<dl)	0 (<dl)	0.3	0.5	0 (<dl)	14
02/08/96 - 02/09/96	August	218.7	0 (<dl)	0 (<dl)	0 (<dl)	1.0	1.0	0 (<dl)	7
03/09/96 - 01/10/96	September	244.2	0.07	0 (<dl)	0 (<dl)	1.9	0.5	0 (<dl)	11
02/10/96 - 04/11/96	October	183.2	0.13	0 (<dl)	0 (<dl)	0.8	0 (<dl)	2.9	5
05/11/96 - 03/12/96	November	60.3	1.30	0 (<dl)	0 (<dl)	1.8	0.6	1.6	7
04/12/96 - 02/01/97	December	44.0	0.30	0 (<dl)	0 (<dl)	5.1	5.9	2.2	56
ICELAND									
Reykjavík	Sum	770.7							
	Mean		0.03	0	0.30	1.88	0.44	0	141.61
Bulk	Min		0	0	0	1.40	0	0	82.00
Monthly	Max		0.10	0	0.80	3.10	1.20	0	210.00
	n		12	12	12	12	12	12	12
	dl		0.05	0.1	0.1	0.1	0.5	0.5	0.1
04/01/96 - 01/02/96	January	69.8	0.06	0 (<dl)	0.5	1.7	0.7	0 (<dl)	82
02/02/96 - 01/03/96	February	107.5	0.06	0 (<dl)	0.2	1.4	0 (<dl)	0 (<dl)	111
02/03/96 - 01/04/96	March	93.9	0.06	0 (<dl)	0.1	1.8	0 (<dl)	0 (<dl)	95
02/04/96 - 02/05/96	April	67.4	0 (<dl)	0 (<dl)	0.2	1.9	0.7	0 (<dl)	163
03/05/96 - 03/06/96	May	45.4	0 (<dl)	0 (<dl)	0.4	2.5	0.7	0 (<dl)	167
04/06/96 - 01/07/96	June	55.3	0 (<dl)	0 (<dl)	0.5	1.7	0.7	0 (<dl)	147
02/07/96 - 01/08/96	July	39.0	0 (<dl)	0 (<dl)	0.5	1.7	0.8	0 (<dl)	180
02/08/96 - 02/09/96	August	70.3	0 (<dl)	0 (<dl)	0.8	1.7	0.6	0 (<dl)	140
03/09/96 - 01/10/96	September	68.0	0 (<dl)	0 (<dl)	0.2	1.9	0.6	0 (<dl)	210
02/10/96 - 04/11/96	October	49.7	0.10	0 (<dl)	0.3	3.1	1.2	0 (<dl)	200
05/11/96 - 03/12/96	November	72.2	0 (<dl)	0 (<dl)	0 (<dl)	2.1	0 (<dl)	0 (<dl)	120
04/12/96 - 02/01/97	December	32.2	0 (<dl)	0 (<dl)	0 (<dl)	1.7	0 (<dl)	0 (<dl)	190

\# As results are possibly too low (see Appendix A)

Sum: Amount of annual precipitation
Mean: Annual weighted mean concentration
Min: Lowest monthly concentration
Max: Highest monthly concentration
n: Number of months
dl: Detection limit

Heavy metals in precipitation: Monthly and annual depositions

	1996	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
ICELAND								
Írafoss	JAN	1406.40	0.00	14.65	278.35	146.50	146.50	2051.00
	FEB	60.38	0.00	41.64	770.34	166.56	374.76	7078.80
	MAR	45.63	0.00	33.80	270.40	84.50	253.50	3718.00
	APR	9.71	0.00	48.56	97.12	461.32	0.00	3035.00
	MAY	9.92	0.00	99.24	148.86	165.40	0.00	3142.60
	JUN	6.53	0.00	39.15	65.25	143.55	0.00	1174.50
	JUL	0.00	0.00	0.00	45.75	76.25	0.00	2135.00
	AUG	0.00	0.00	0.00	218.70	218.70	0.00	1530.90
	SEP	17.09	0.00	0.00	463.98	122.10	0.00	2686.20
	OCT	23.82	0.00	0.00	146.56	0.00	531.28	916.00
	NOV	78.39	0.00	0.00	108.54	36.18	96.48	422.10
	DEC	13.20	0.00	0.00	224.40	259.60	96.80	2464.00
	TOTAL	1671.07	0.00	277.04	2838.25	1880.66	1499.32	30354.10

	1996	Cd µg/m2	As µg/m2	Cr µg/m2	Cu µg/m2	Ni µg/m2	Pb µg/m2	Zn µg/m2
ICELAND								
Reykjavík	JAN	4.19	0.00	34.90	118.66	48.86	0.00	5723.60
	FEB	6.45	0.00	21.50	150.50	0.00	0.00	11932.50
	MAR	5.63	0.00	9.39	169.02	0.00	0.00	8920.50
	APR	0.00	0.00	13.48	128.06	47.18	0.00	10986.20
	MAY	0.00	0.00	18.16	113.50	31.78	0.00	7581.80
	JUN	0.00	0.00	27.65	94.01	38.71	0.00	8129.10
	JUL	0.00	0.00	19.50	66.30	31.20	0.00	7020.00
	AUG	0.00	0.00	56.24	119.51	42.18	0.00	9842.00
	SEP	0.00	0.00	13.60	129.20	40.80	0.00	14280.00
	OCT	4.97	0.00	14.91	154.07	59.64	0.00	9940.00
	NOV	0.00	0.00	0.00	151.62	0.00	0.00	8664.00
	DEC	0.00	0.00	0.00	54.74	0.00	0.00	6118.00
	TOTAL	21.24	0.00	229.33	1449.19	340.35	0.00	109137.70

Heavy metals in precipitation: Anomalous* concentration values as measured (time sequence)

		Cd µg/l		As µg/l		Cr µg/l		Cu µg/l		Ni µg/l		Pb µg/l		Zn µg/l	
ICELAND	Febr.92							32.5	high			7.3	high	1800	high
Írafoss	Dec.92											6.8	high	235	high
Wet only	Apr.94	5.4	high					33.0	high					7030	high
Monthly	May 94							16.0	high						
	July 94	3.0	high											2230	high
	Apr.95							12.7	high						
	July 95									25.5	high				
	Nov.95									53.0	high				
	Dec.95	48.0	high									5.2	high		
	Jan.96	9.6	high												
ICELAND	Febr.92											3.8	high		
Reykjavík	Aug.94	0.31	high					11.0	high					500	high
Bulk	June 95									6.5	high	3.2	high		
Monthly															

* The criteria are different for each element and for each of the two stations, see next table.

Heavy metals in precipitation: Anomalous* concentration values as measured (descending series)

	Cd µg/l		As µg/l		Cr µg/l		Cu µg/l		Ni µg/l		Pb µg/l		Zn µg/l	
ICELAND	48.0	high					33.0	high	53.0	high	7.3	high	7030	high
Írafoss	9.6	high					32.5	high	25.5	high	6.8	high	2230	high
Wet only	5.4	high					16.0	high			5.2	high	1800	high
Monthly	3.0	high					12.7	high					235	high
Next value (not tagged)	1.3						6.7		8.0		3.6		86	
ICELAND														
Reykjavík	0.31	high					11.0	high	6.5	high	3.8	high	500	high
Bulk											3.2	high		
Monthly														
Next value (not tagged)	0.11						7.1		1.5		1.6		370	

* The criteria for tagging are somewhat arbitrary and are indicated by the lowest rows (shaded).

Appendix C

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4. Average concentrations of heavy metals in air
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9. Annual weighted mean concentration of POPs in precipitation
10. Annual average concentration of POPs in air
11. Two-weekly variation in deposition of DDTs
12. Two-weekly variation in deposition of DDTs ignoring extreme value
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Írafoss and Reykjavík 1992, 1993, 1994, 1995, 1996:

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38. Monthly variation in Cu deposition in a five year period
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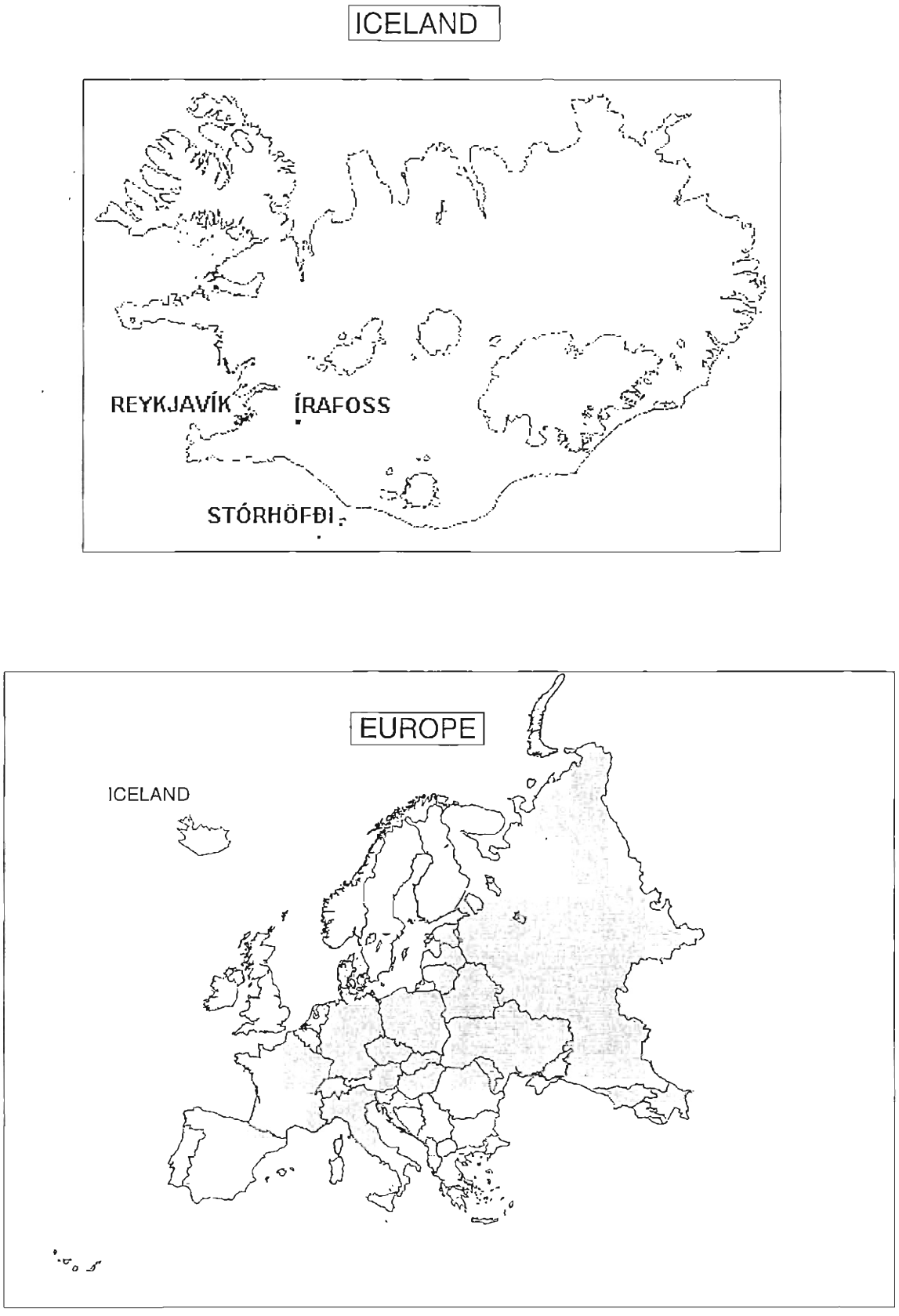
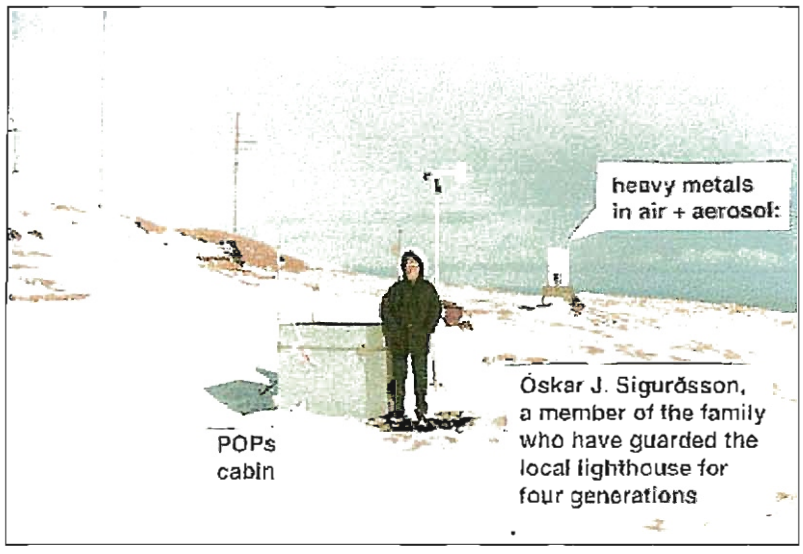
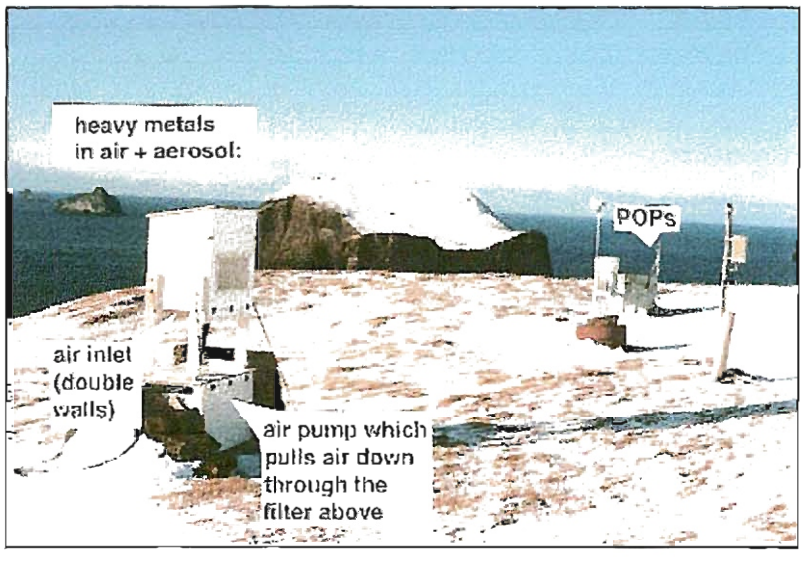


Figure 1. Location of the stations described in this report.

Figure 2a. Photographs from Stórhöfði station - heavy metals in air





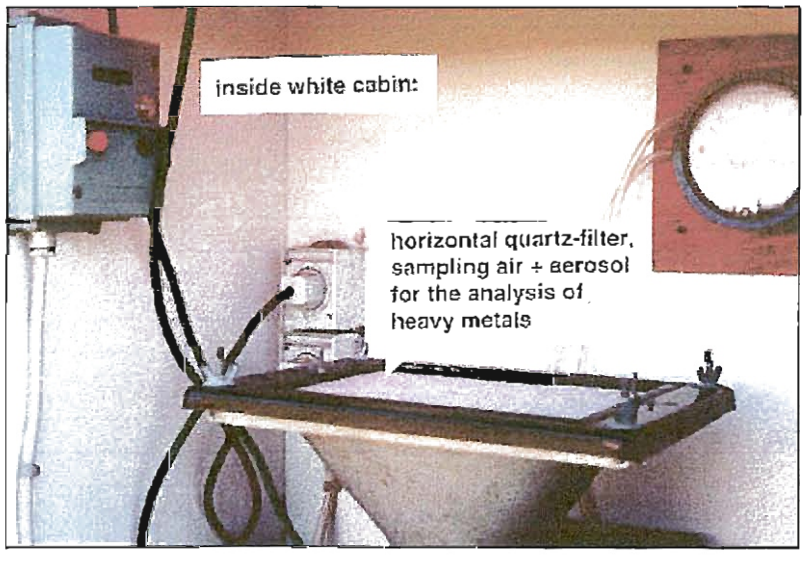
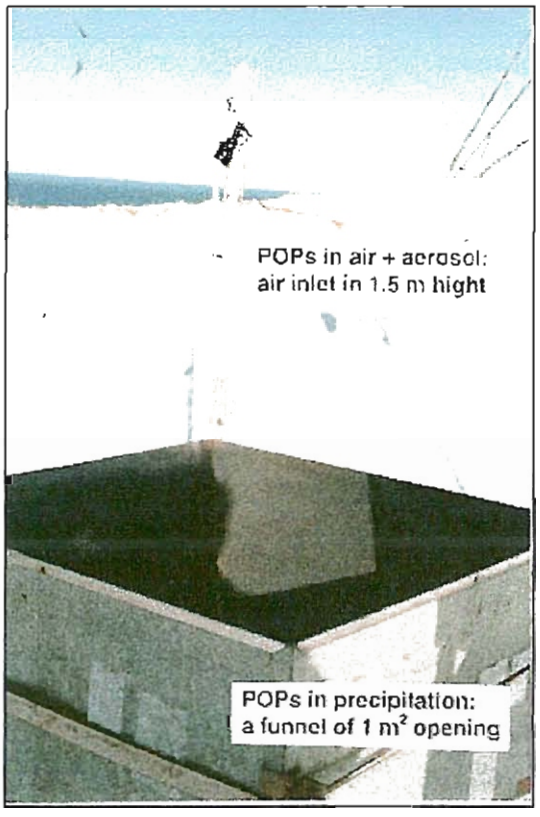
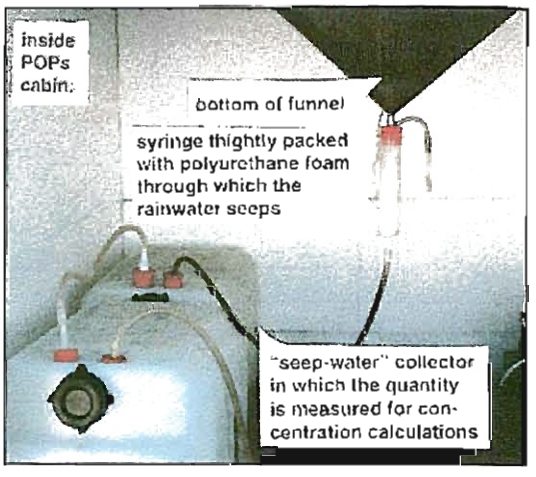
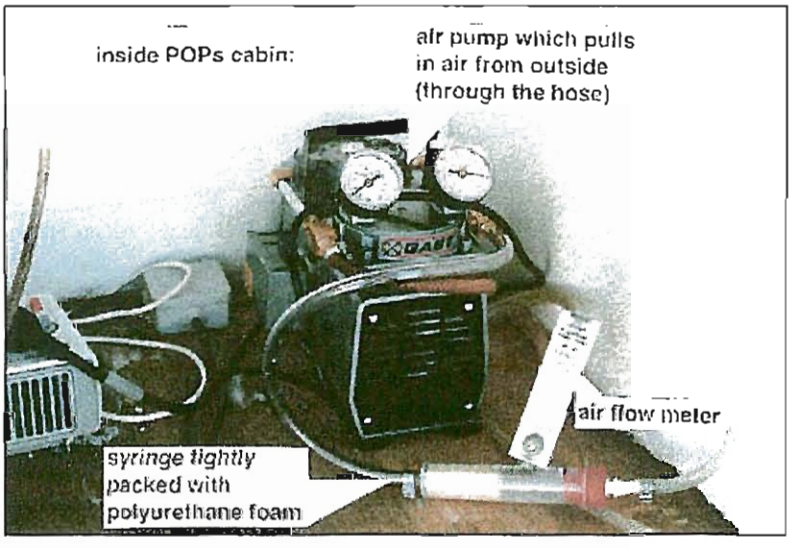


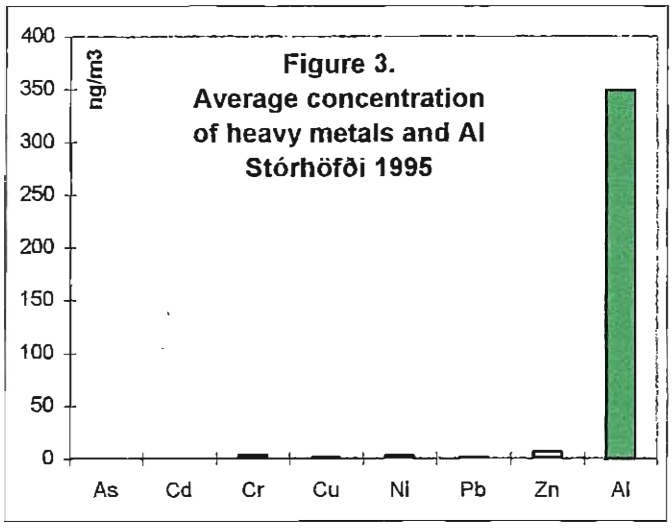
Figure 2b. Photographs from Stórhöfði station - POPs

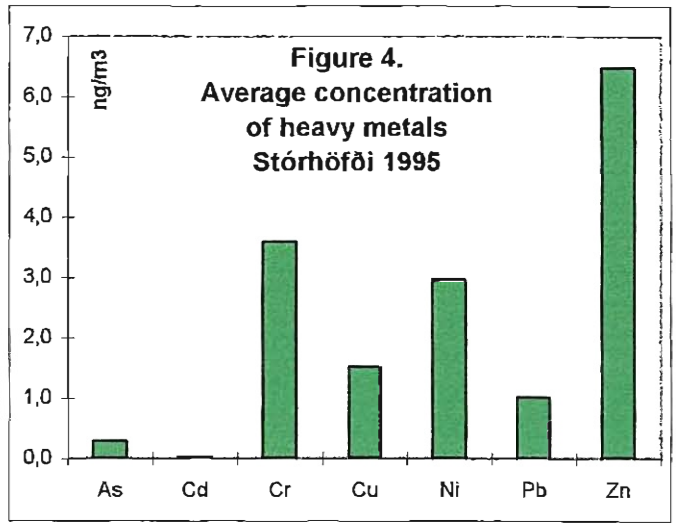


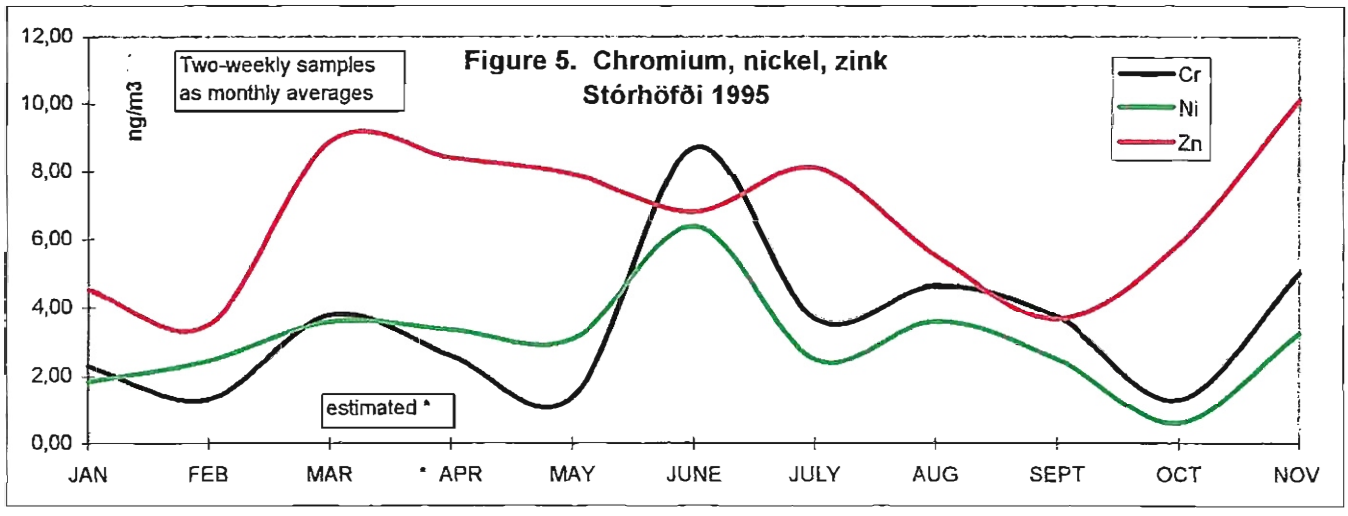


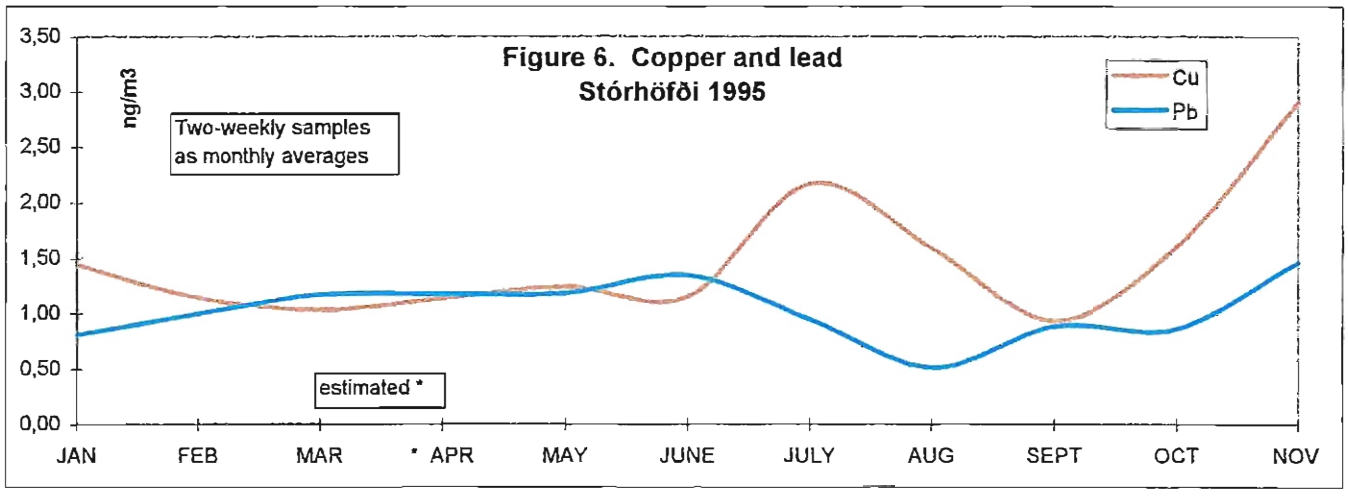


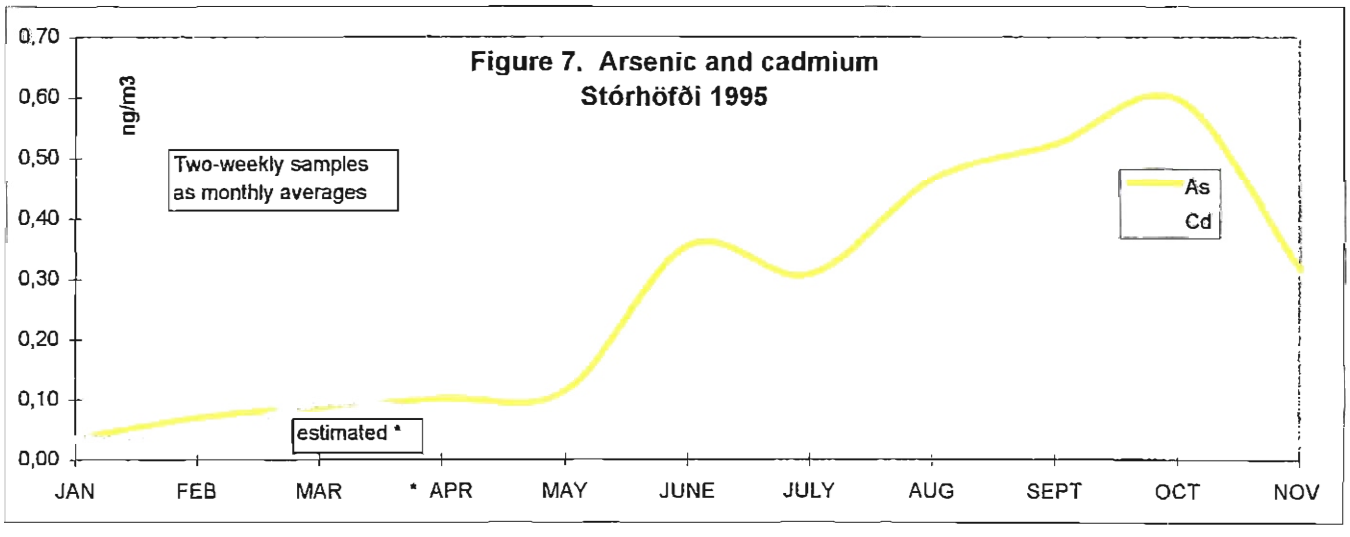
HEAVY METALS IN AIR



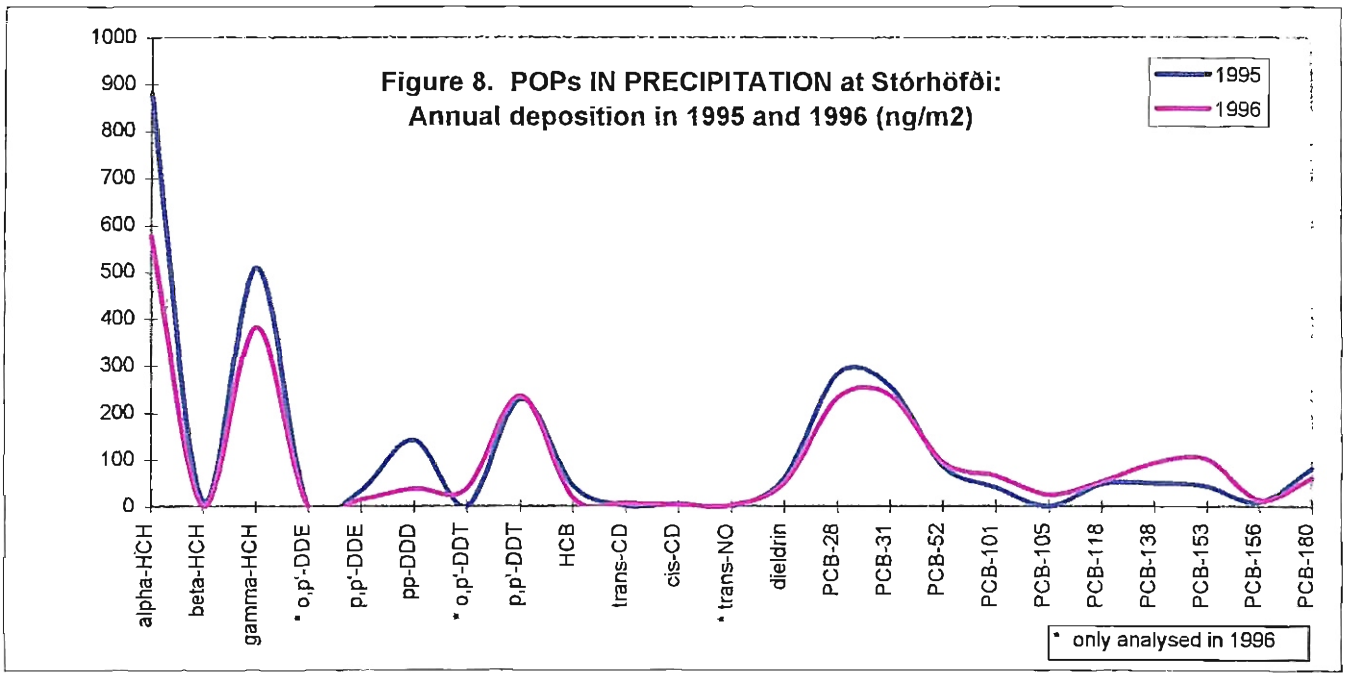


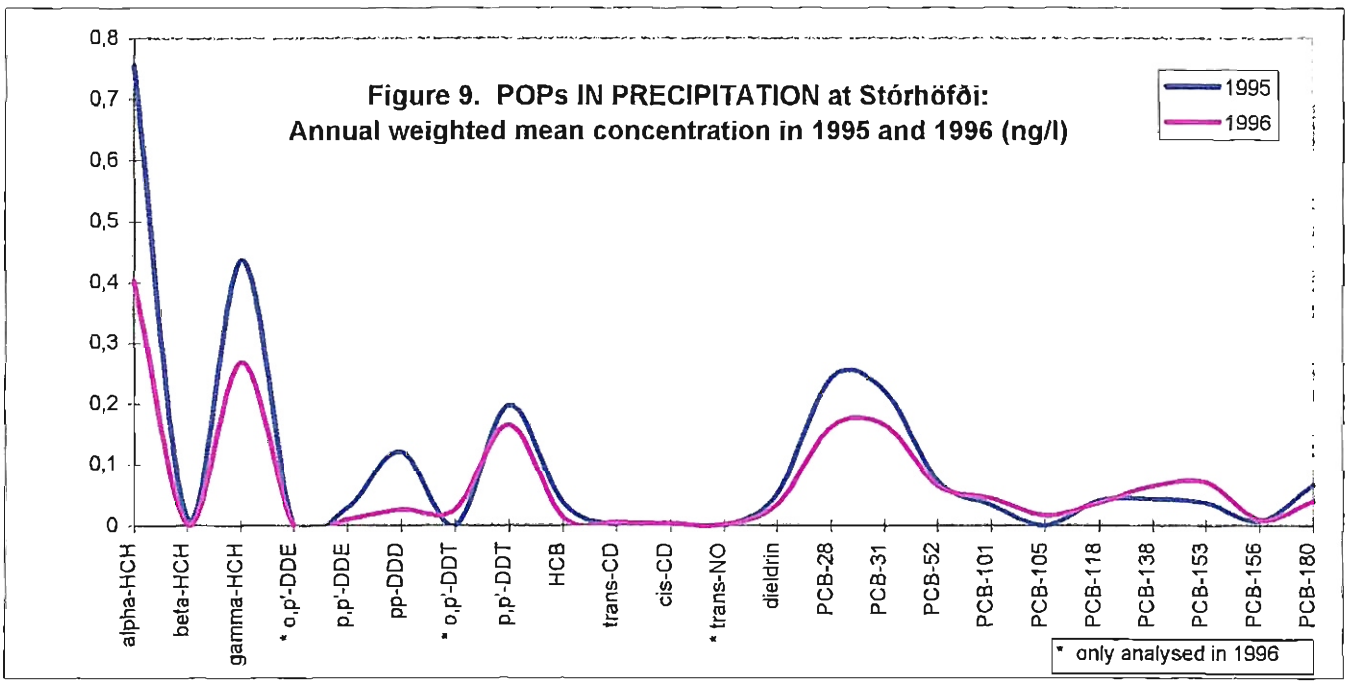


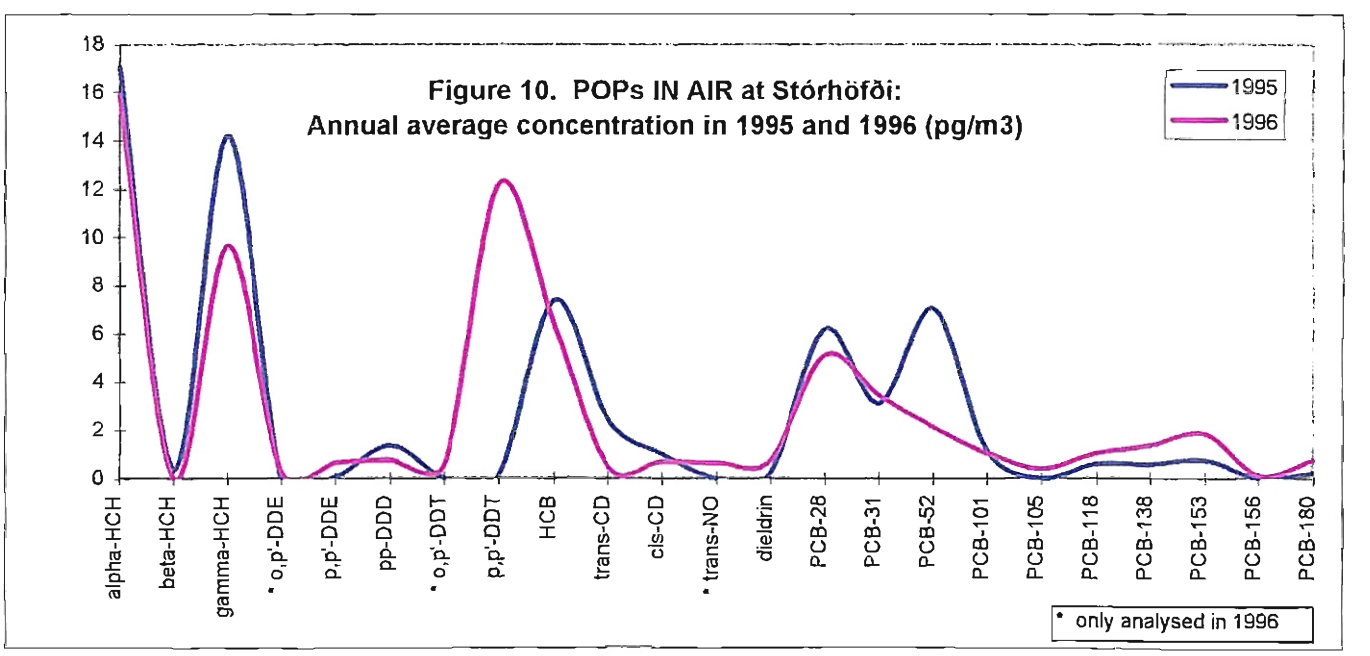




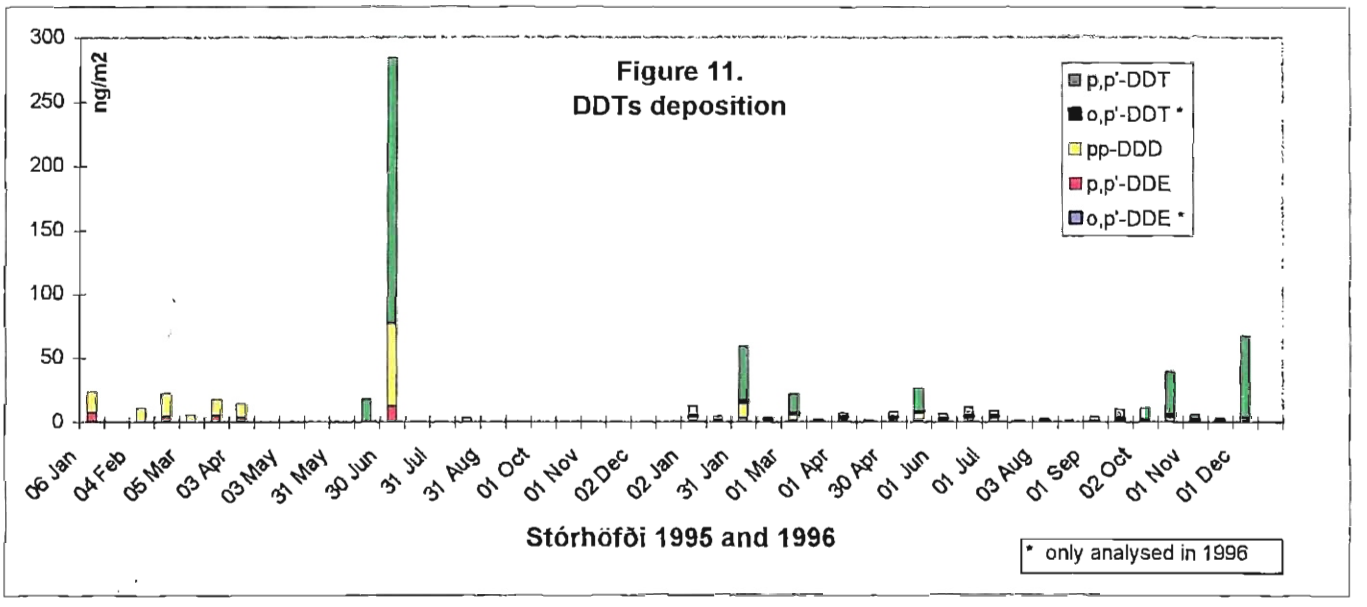
POPs MAIN RESULTS - PROFILES

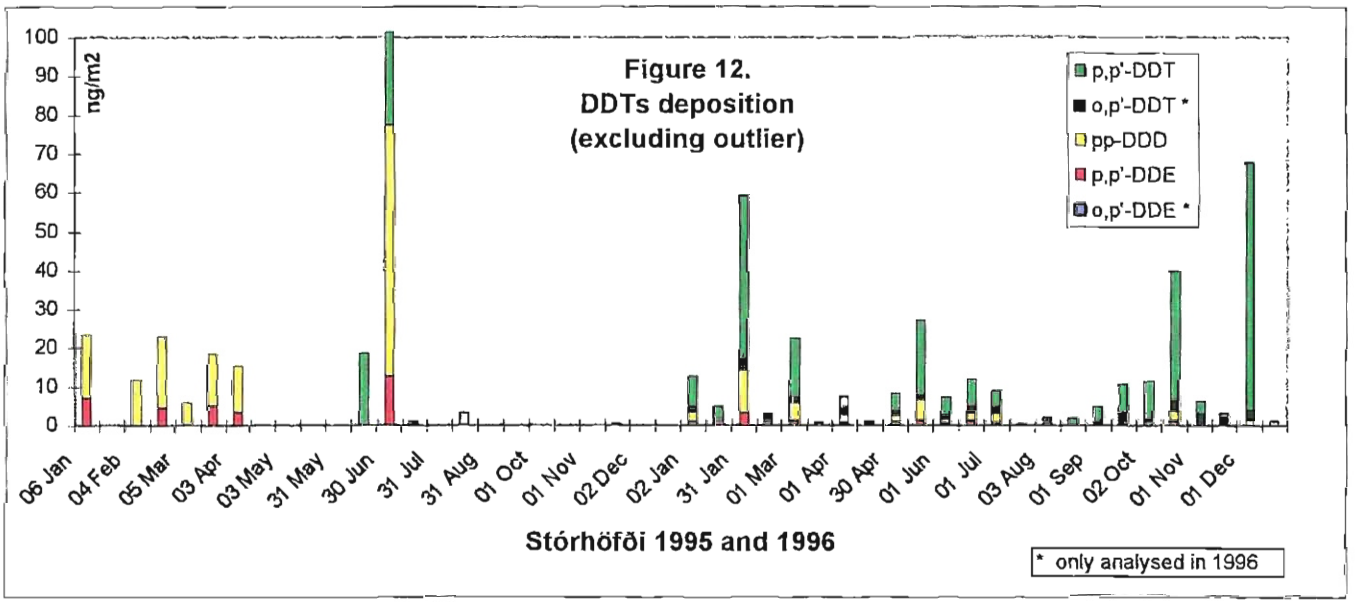


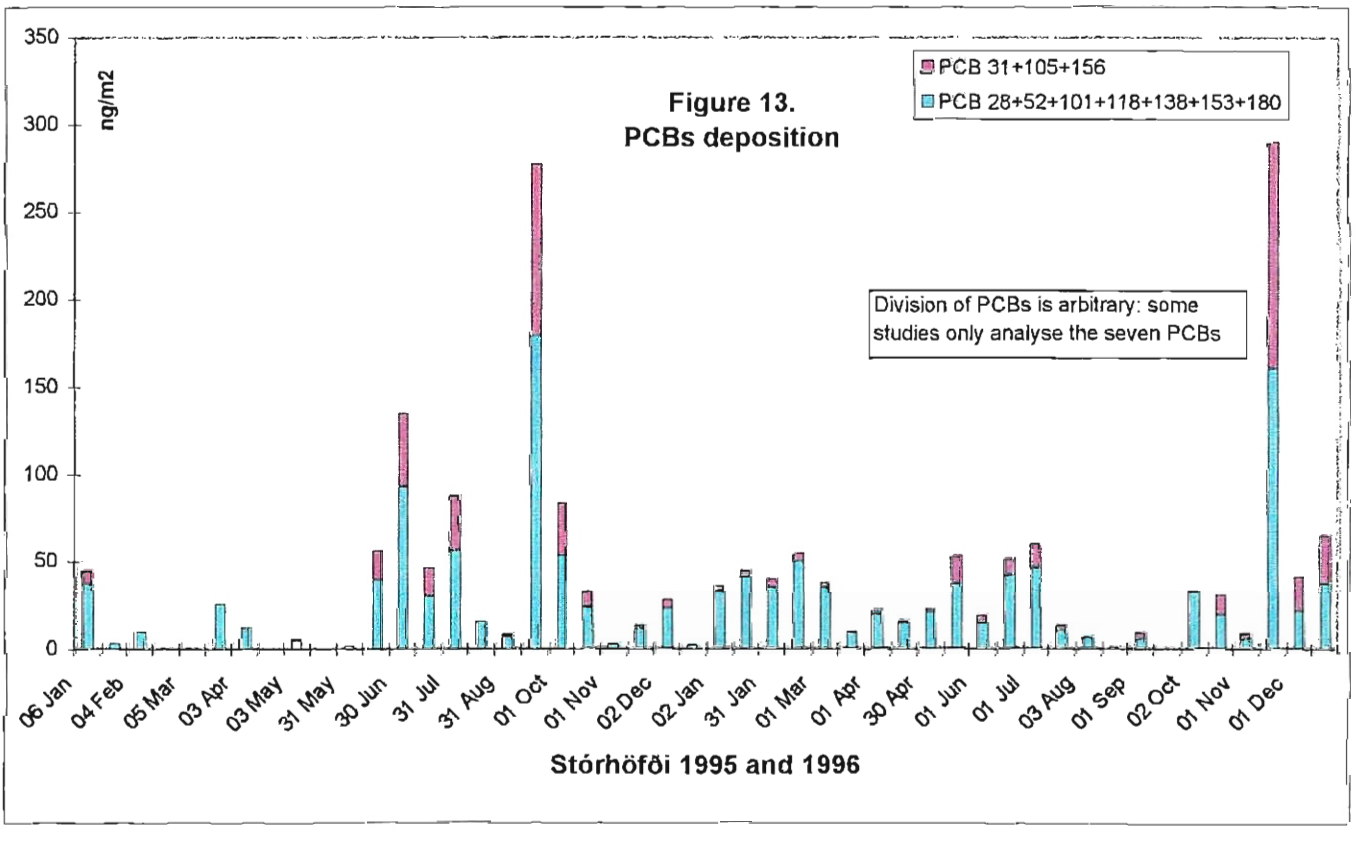




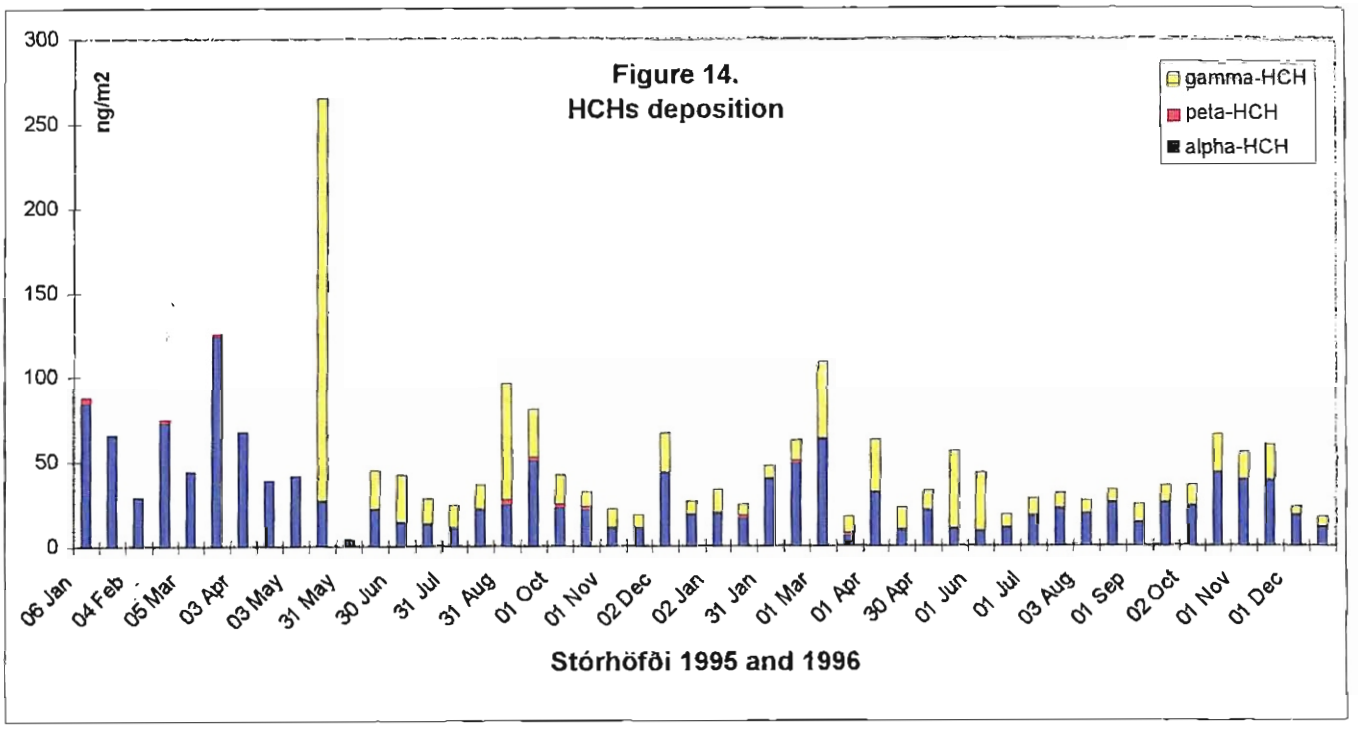
POPs IN PRECIPITATION

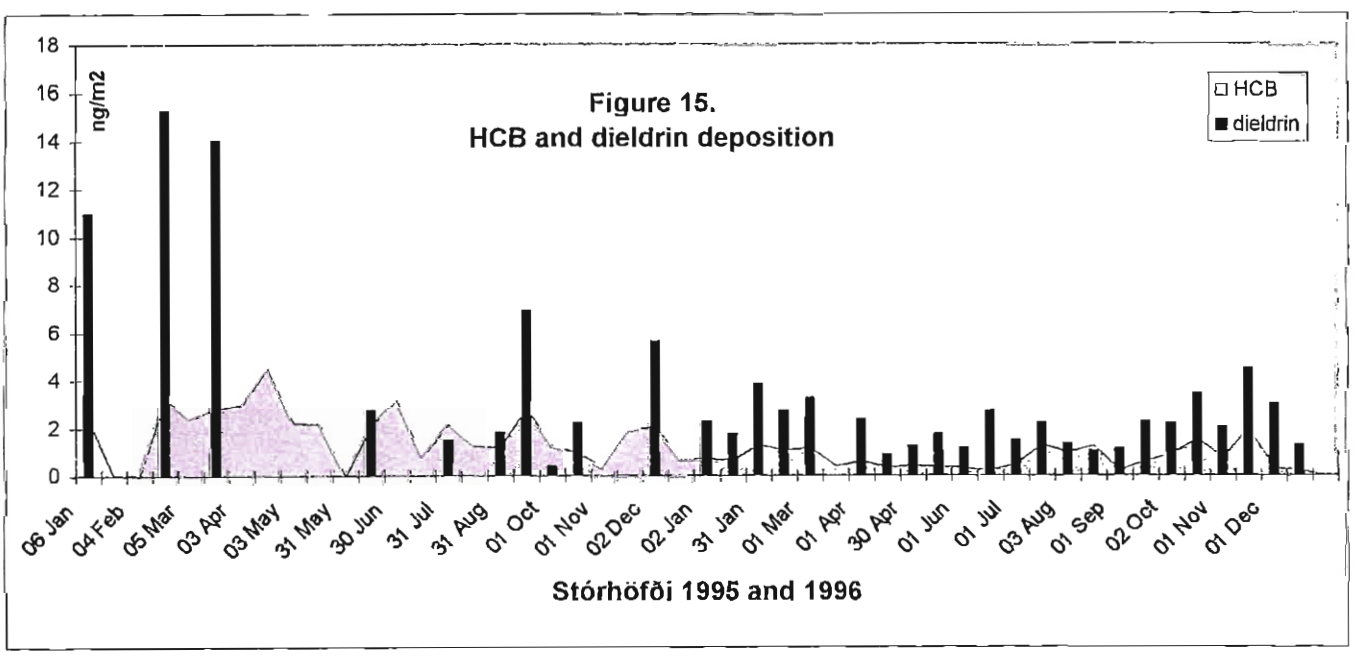


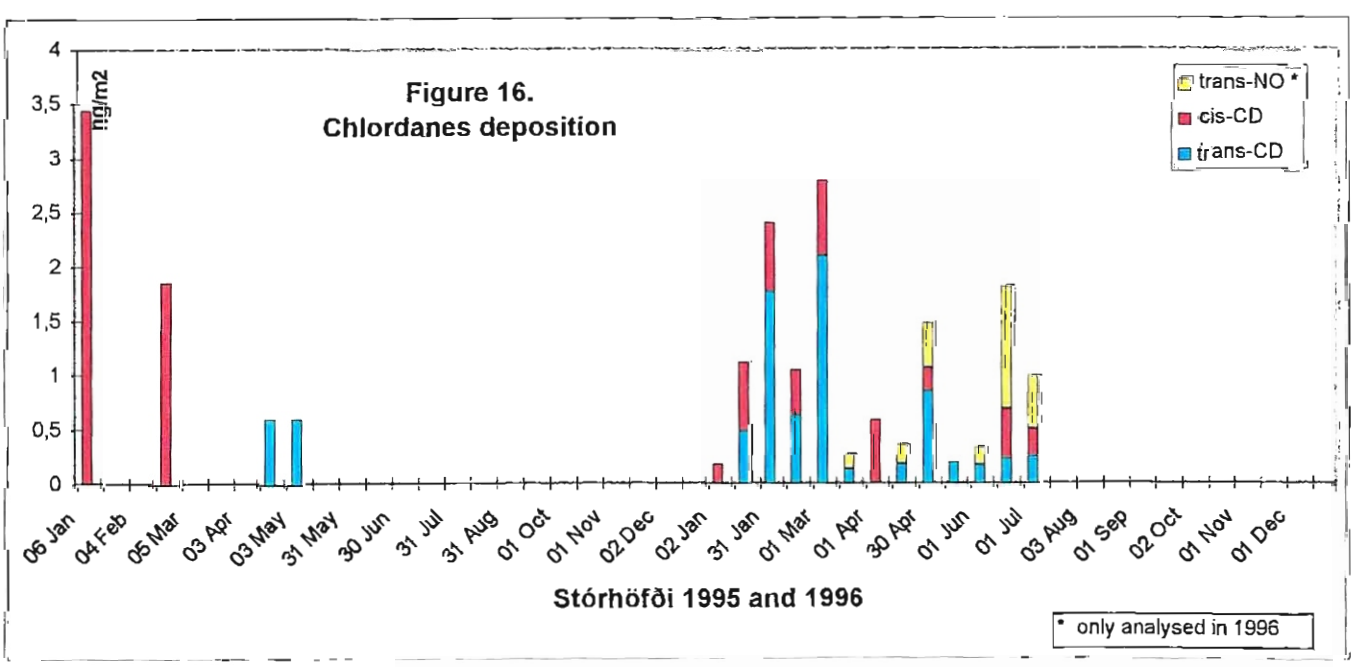




POPs IN PRECIPITATION







POPs IN AIR

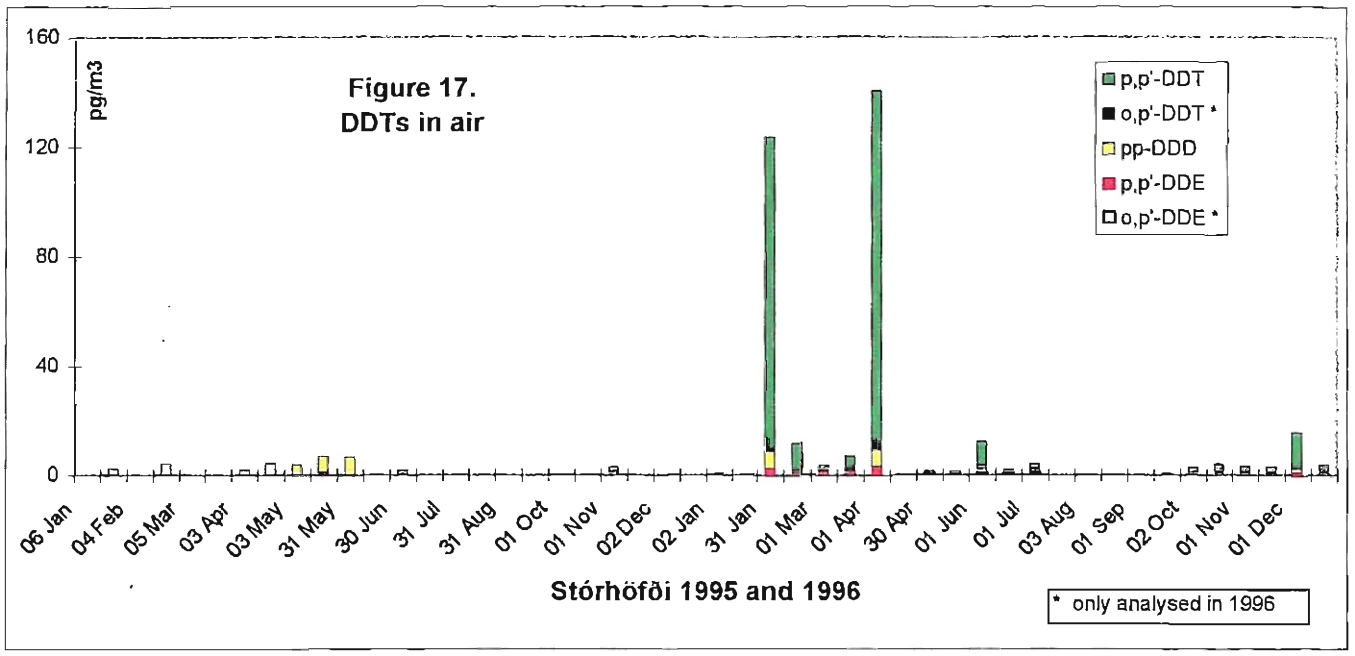


Figure 17.
DDTs in air
pg/m3
160
120
80
40
0
p,p'-DDT
o,p'-DDT *
pp-DDD
p,p'-DDE
o,p'-DDE *
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996
* only analysed in 1996

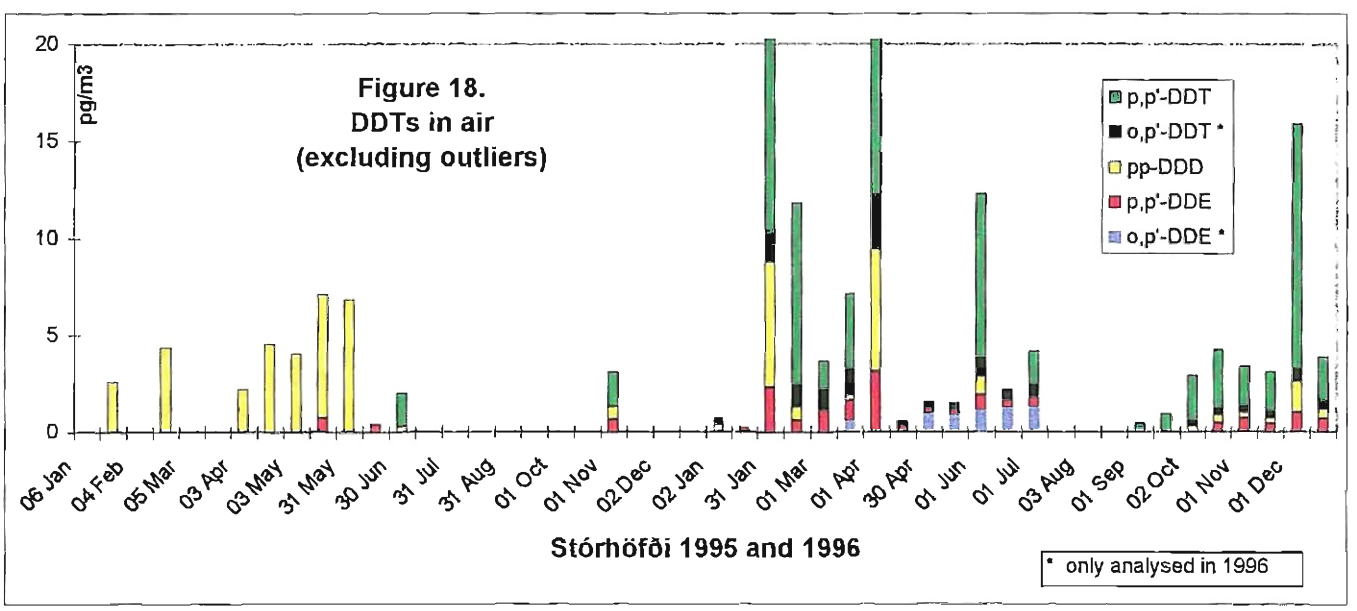


Figure 18.
DDTs in air
(excluding outliers)
pg/m3
20
15
10
5
0
p,p'-DDT
o,p'-DDT *
pp-DDD
p,p'-DDE
o,p'-DDE *
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996
* only analysed in 1996

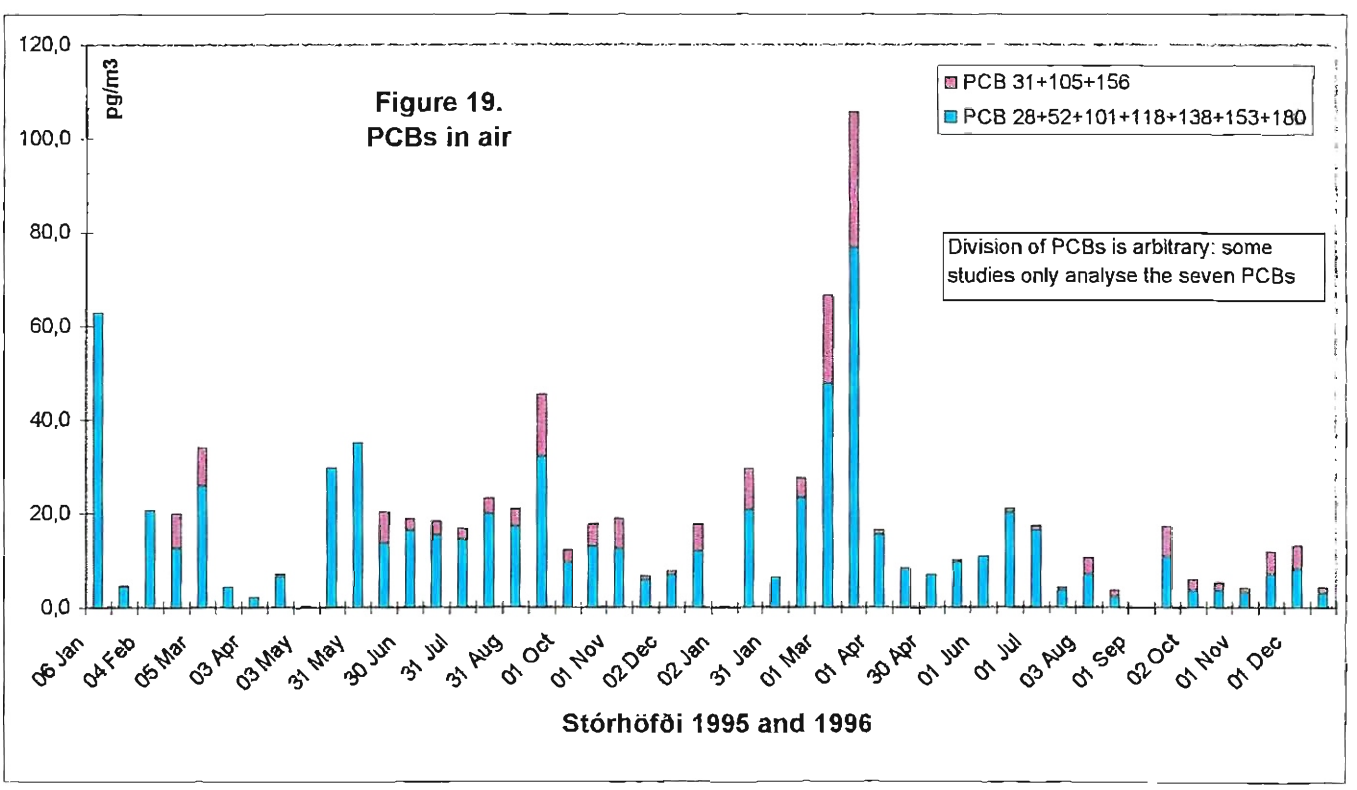


Figure 19.
PCBs in air
pg/m3
120,0
100,0
80,0
60,0
40,0
20,0
0,0
PCB 31+105+156
PCB 28+52+101+118+138+153+180
Division of PCBs is arbitrary: some studies only analyse the seven PCBs
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996

POPs IN AIR

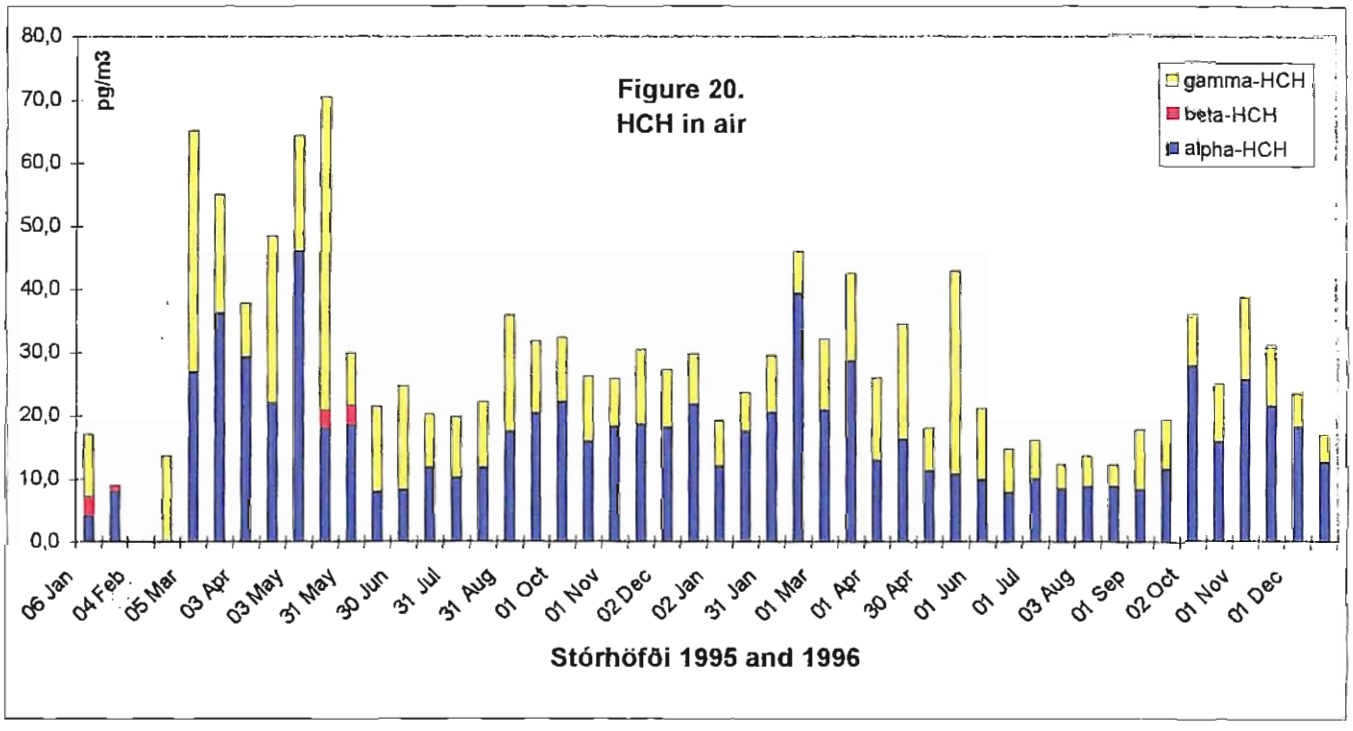


Figure 20.
HCH in air
pg/m3
gamma-HCH
beta-HCH
alpha-HCH
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996

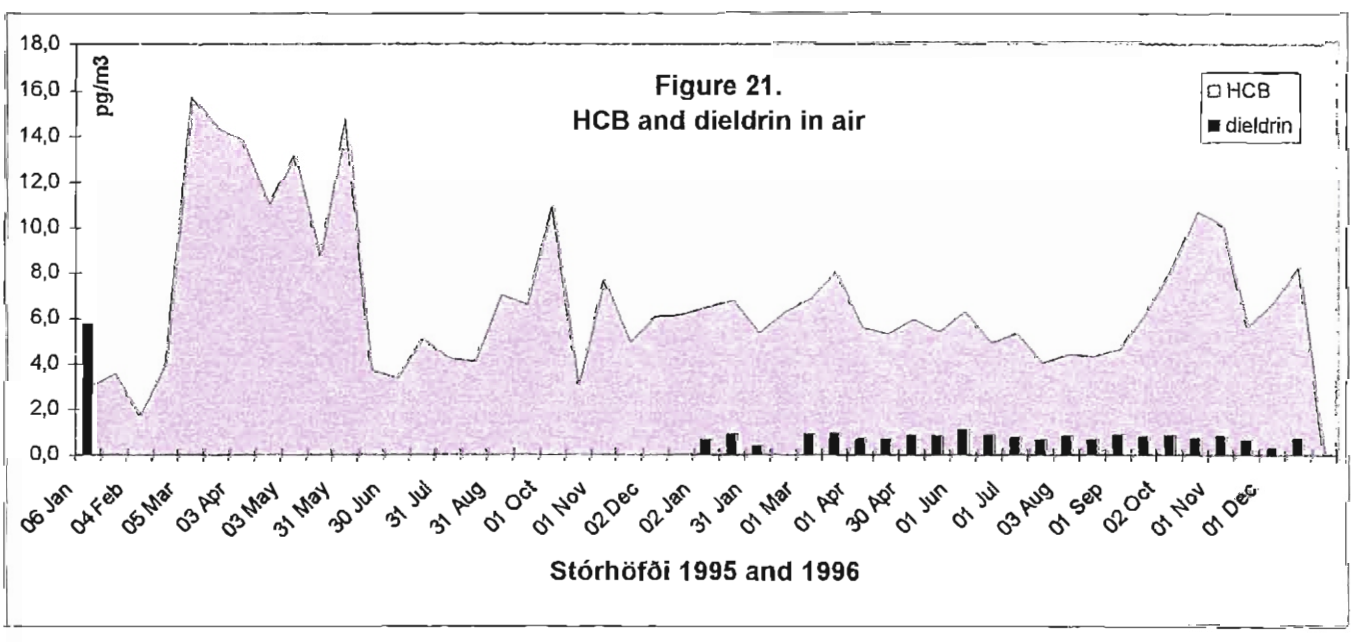


Figure 21.
HCB and dieldrin in air
pg/m3
HCB
dieldrin
18,0
16,0
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996

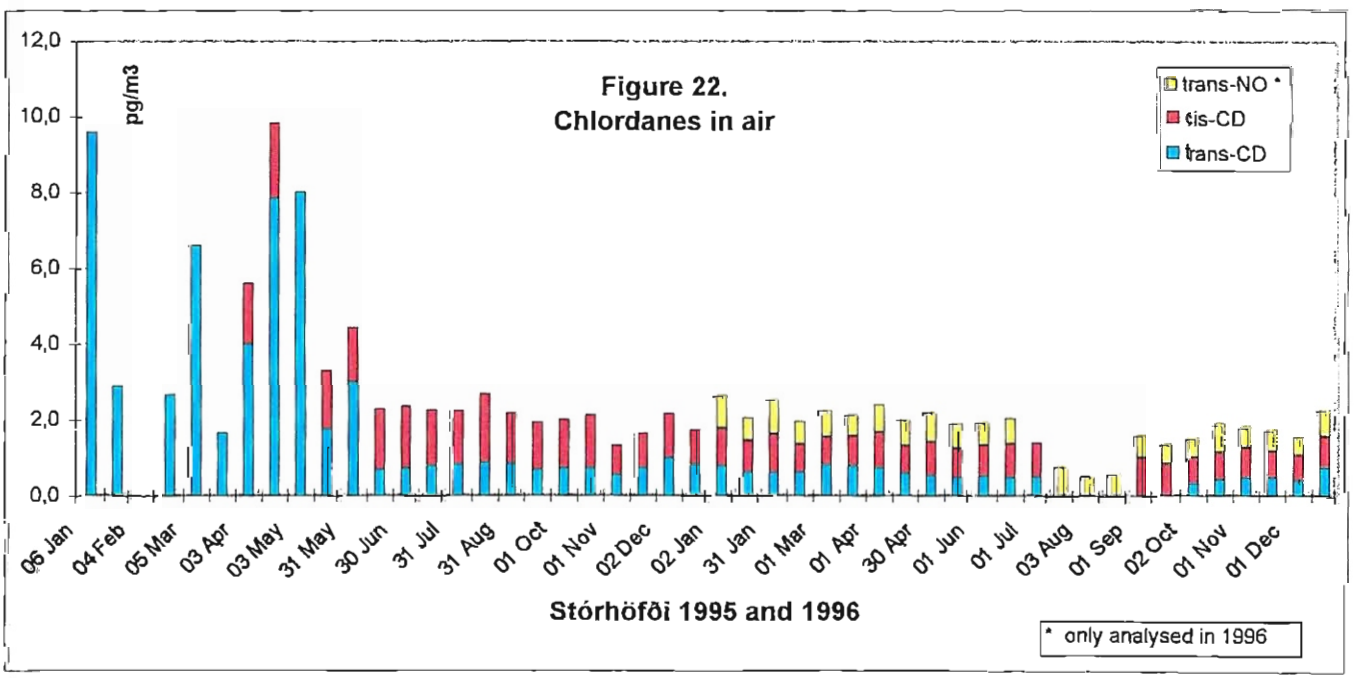
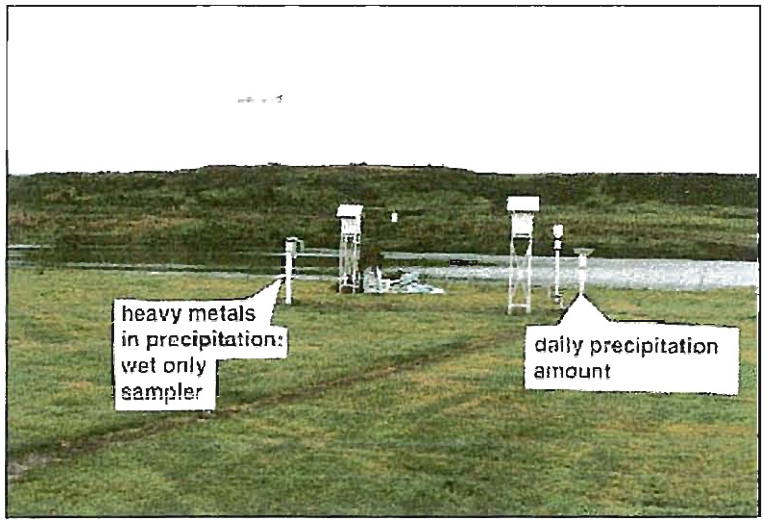
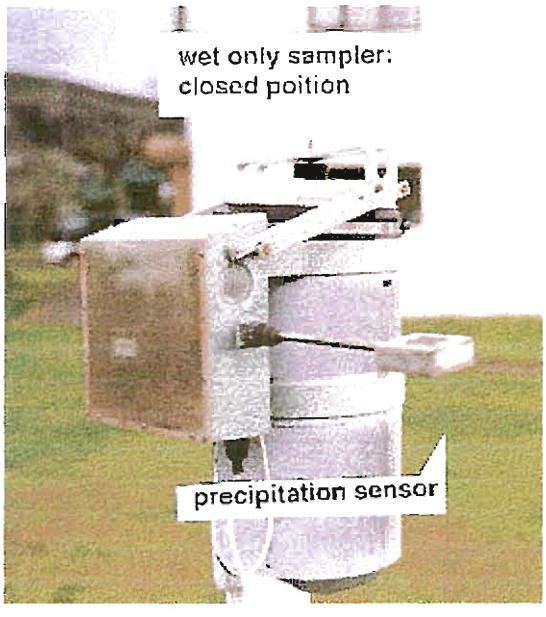


Figure 22.
Chlordanes in air
pg/m3
trans-NO *
cis-CD
trans-CD
12,0
10,0
8,0
6,0
4,0
2,0
0,0
06 Jan
04 Feb
05 Mar
03 Apr
03 May
31 May
30 Jun
31 Jul
31 Aug
01 Oct
01 Nov
02 Dec
02 Jan
31 Jan
01 Mar
01 Apr
30 Apr
01 Jun
01 Jul
03 Aug
01 Sep
02 Oct
01 Nov
01 Dec
Stórhöfði 1995 and 1996
* only analysed in 1996

Figure 23a. Photographs from Írafoss station





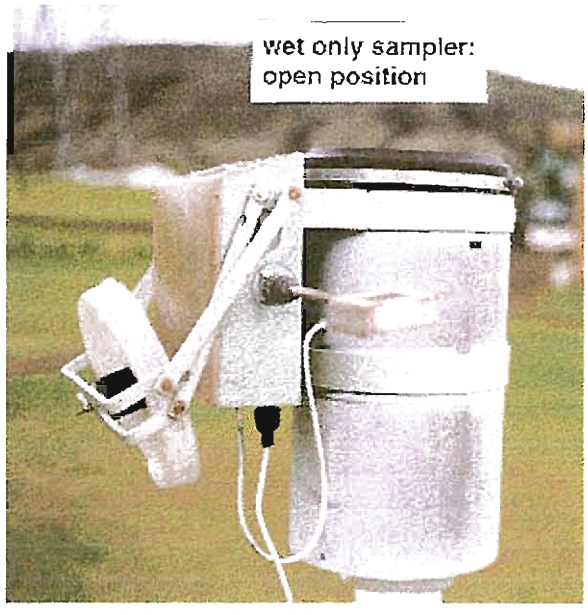
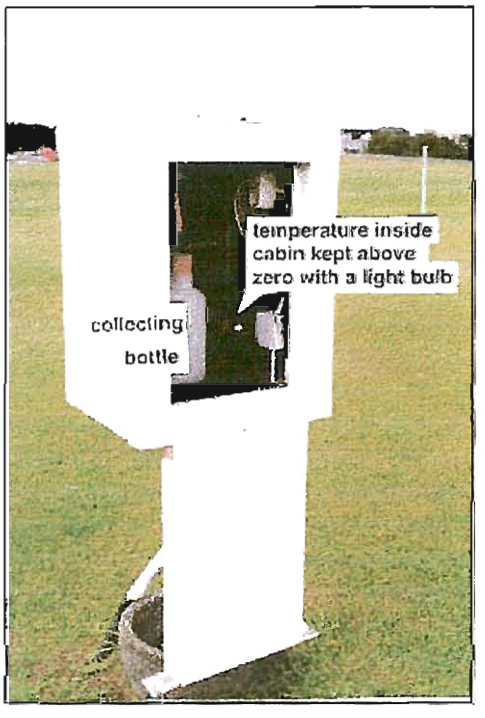
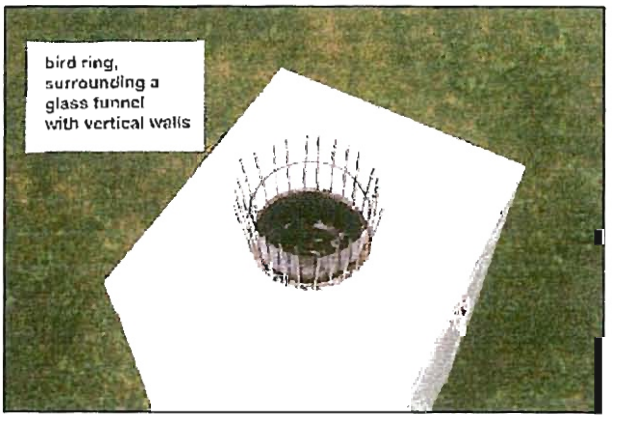


Figure 23b. Photographs from Reykjavík station





HEAVY METALS IN PRECIPITATION: DEPOSITION

Figure 24. Cadmium annual deposition

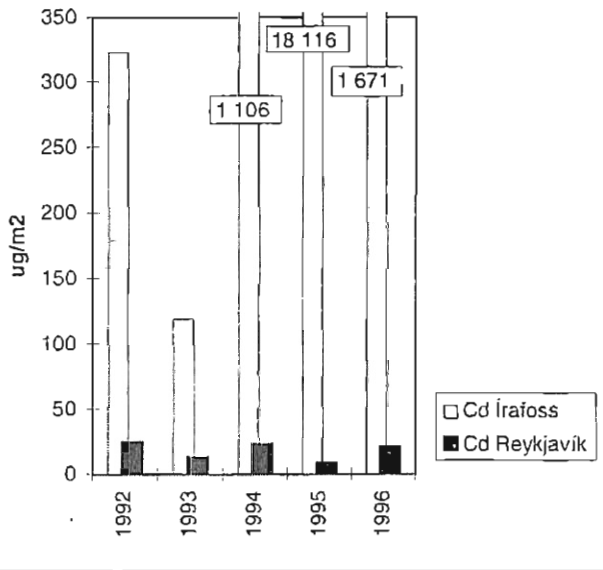


Figure 25. Chromium annual deposition

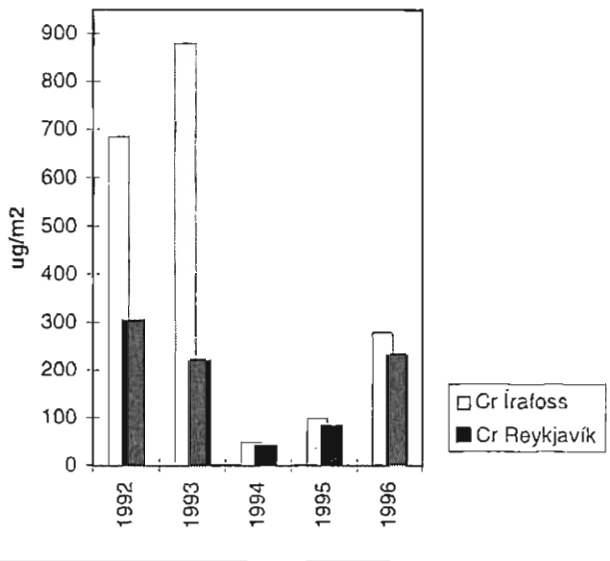


Figure 26. Copper annual deposition

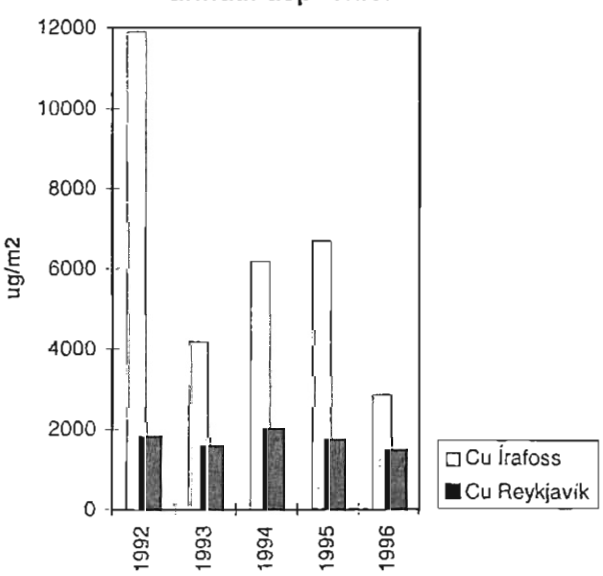


Figure 27. Nickel annual deposition

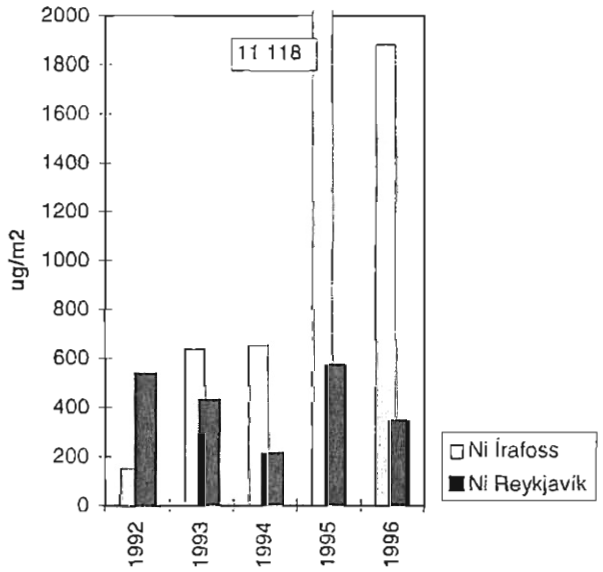


Figure 28. Lead annual deposition

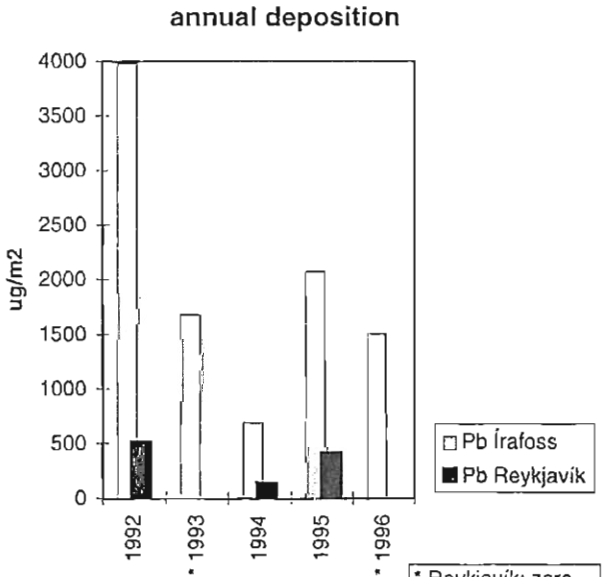
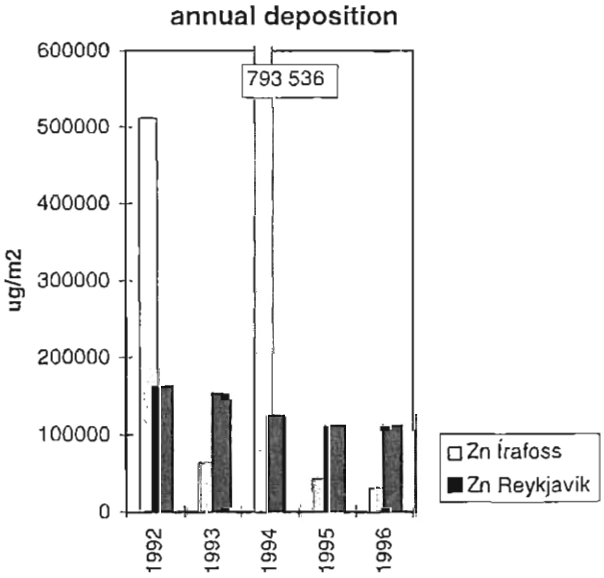


Figure 29. Zink annual deposition



HEAVY METALS IN PRECIPITATION: CONCENTRATION

Figure 30. Cadmium
annual weighted mean concentration

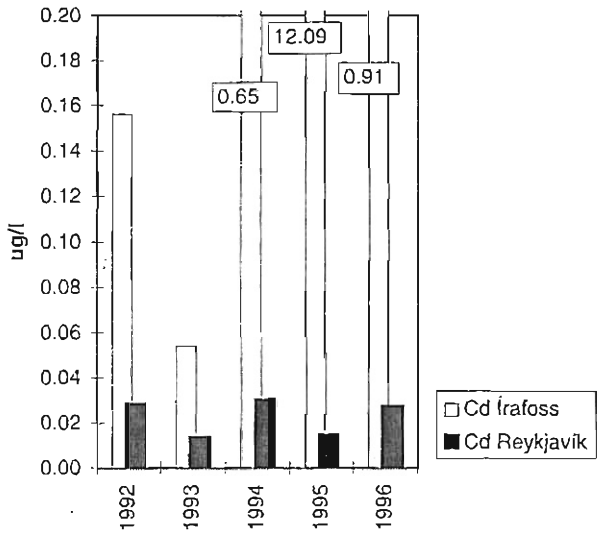


Figure 31. Chromium
annual weighted mean concentration

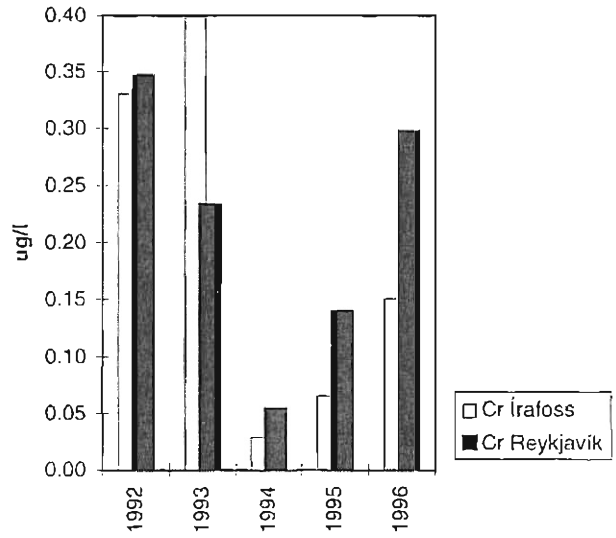


Figure 32. Copper
annual weighted mean concentration

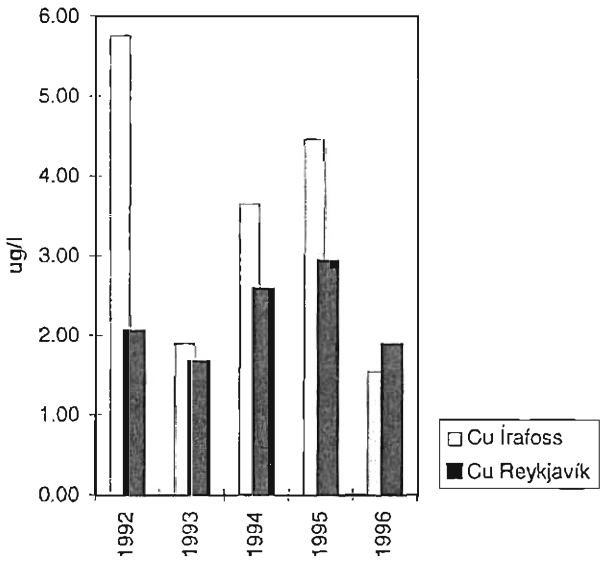


Figure 33. Nickel
annual weighted mean concentration

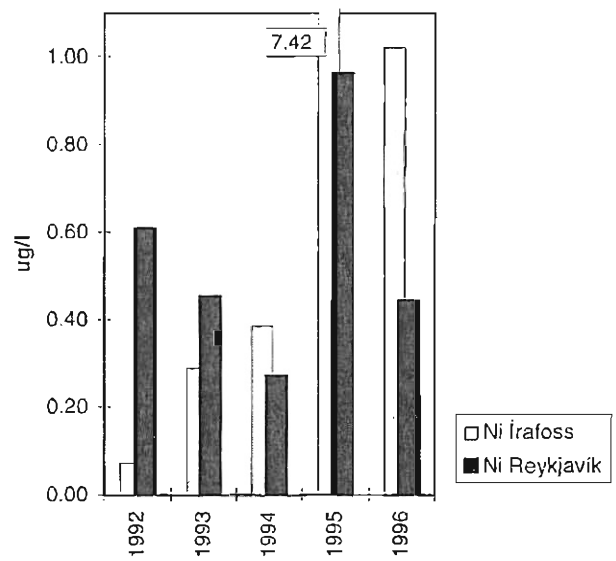


Figure 34. Lead
annual weighted mean concentration

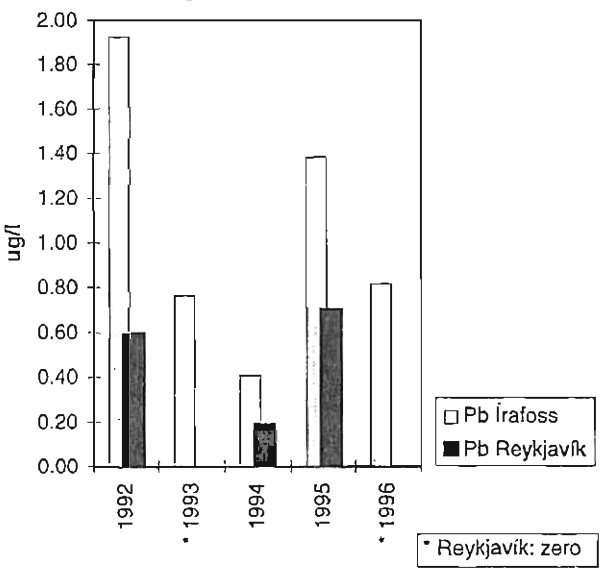
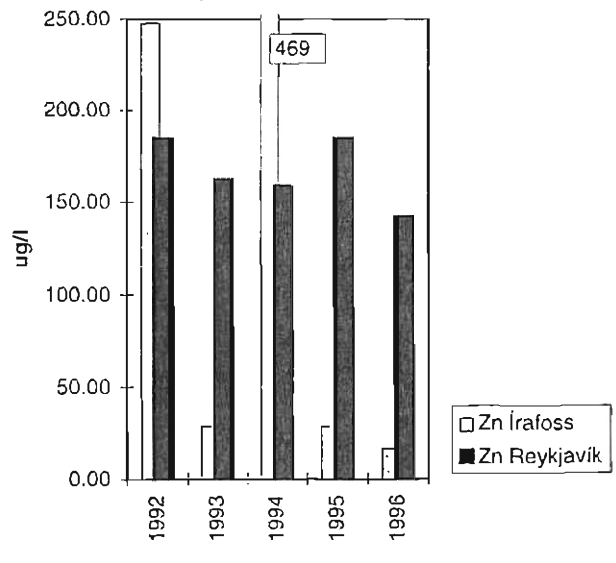


Figure 35. Zink
annual weighted mean concentration



HEAVY METALS IN PRECIPITATION: MONTHLY VARIATION

Figure 36. Cadmium deposition (ug/m2)

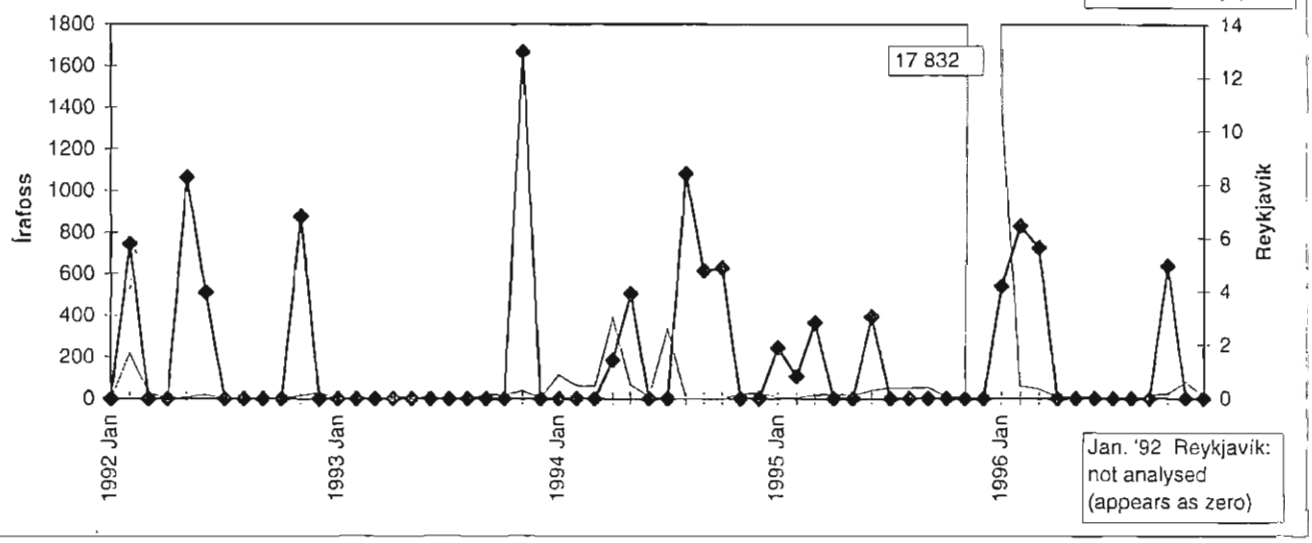


Figure 37. Chromium deposition (ug/m2)

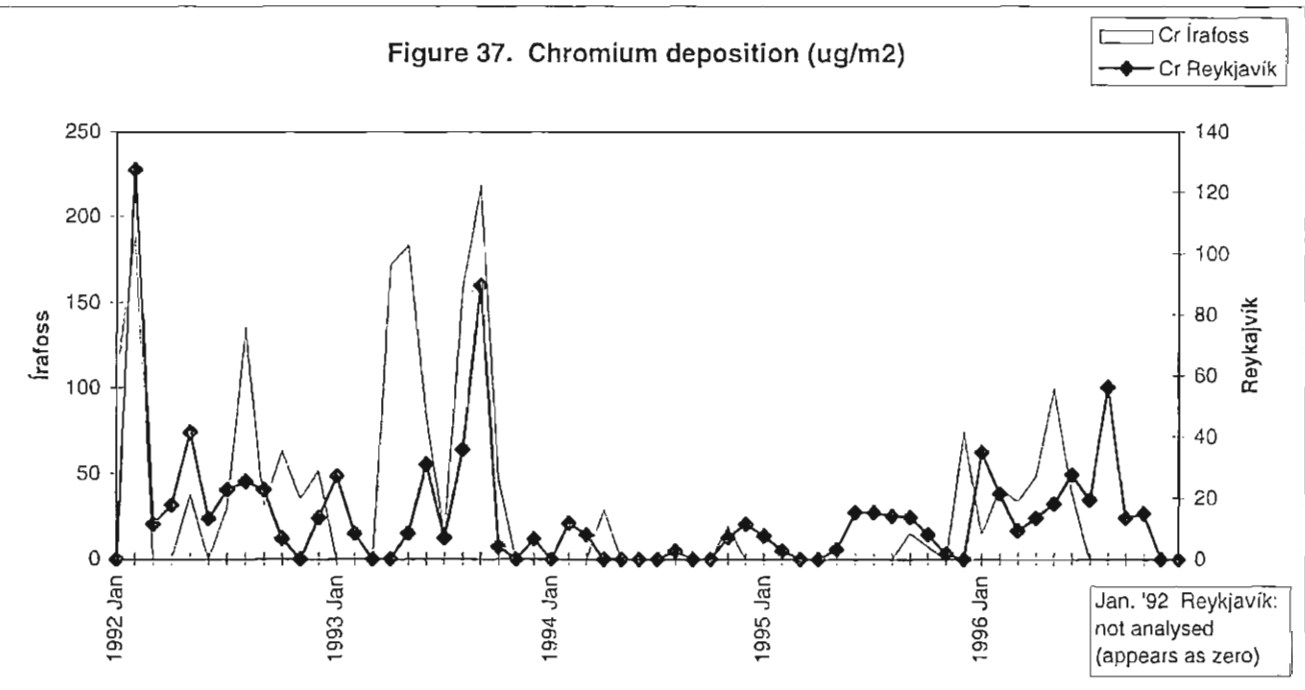
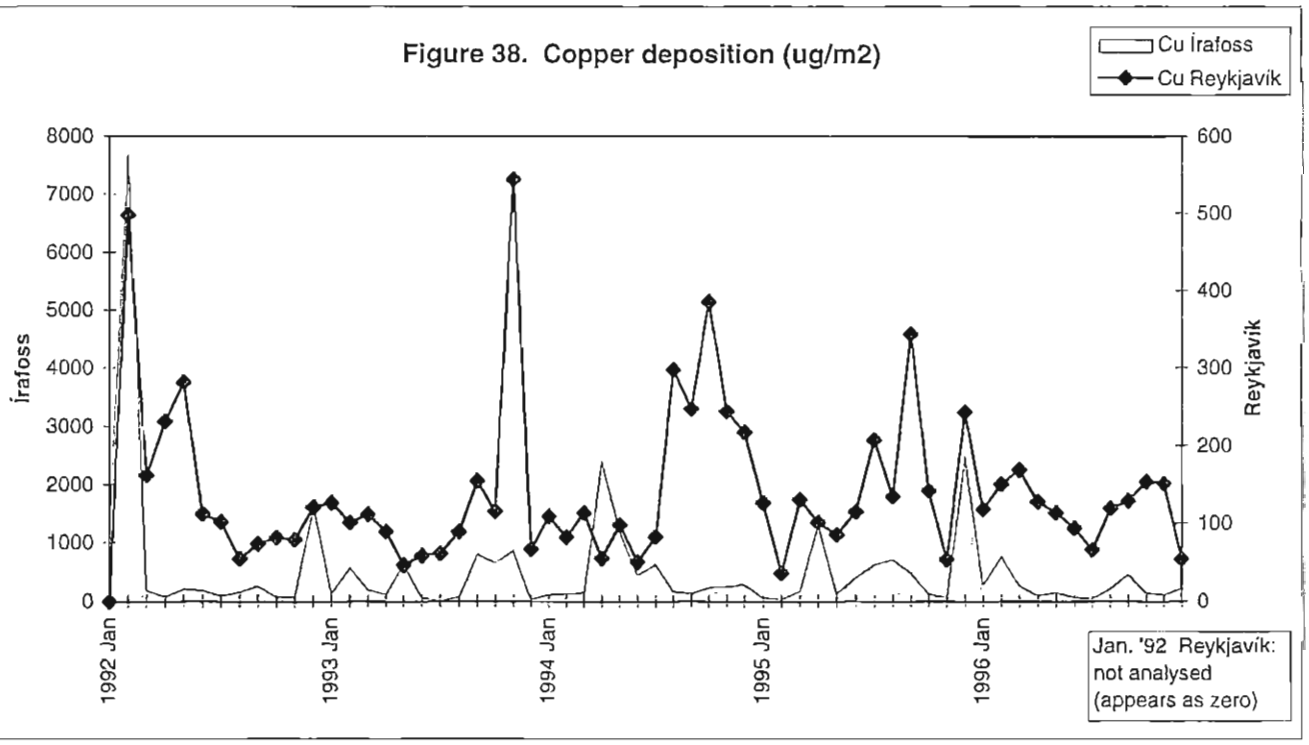


Figure 38. Copper deposition (ug/m2)



HEAVY METALS IN PRECIPITATION: MONTHLY VARIATION

Figure 39. Nickel deposition (ug/m2)

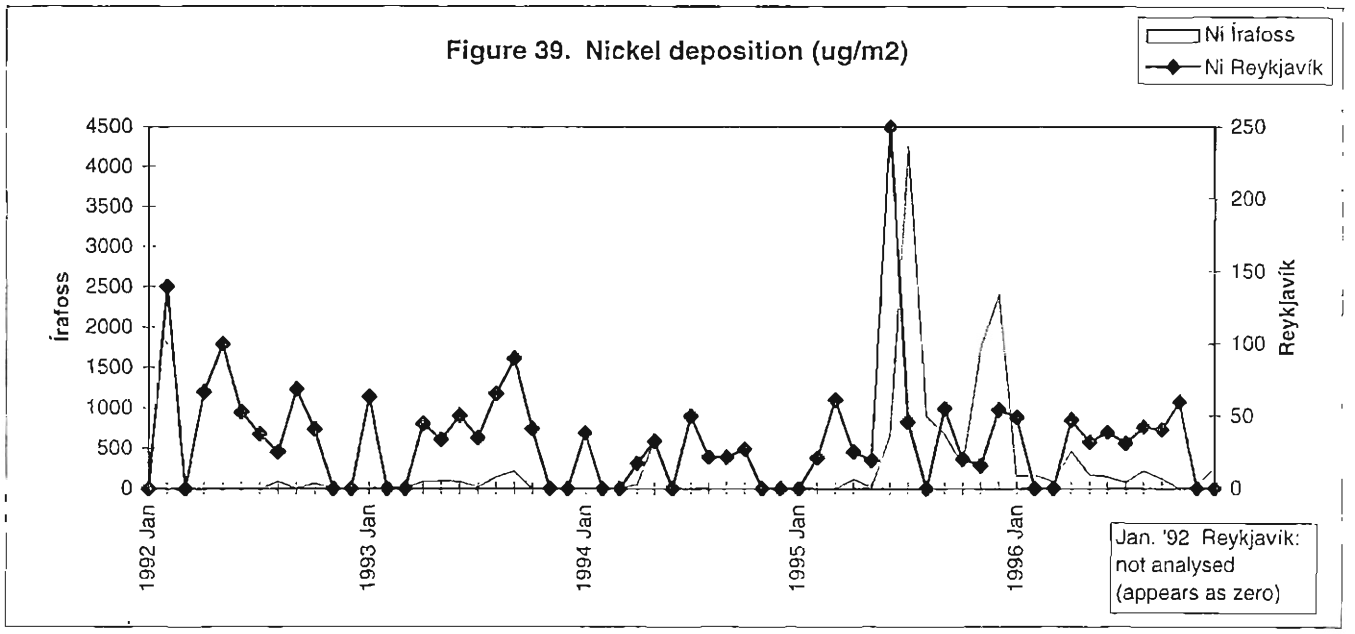


Figure 40. Lead deposition (ug/m2)

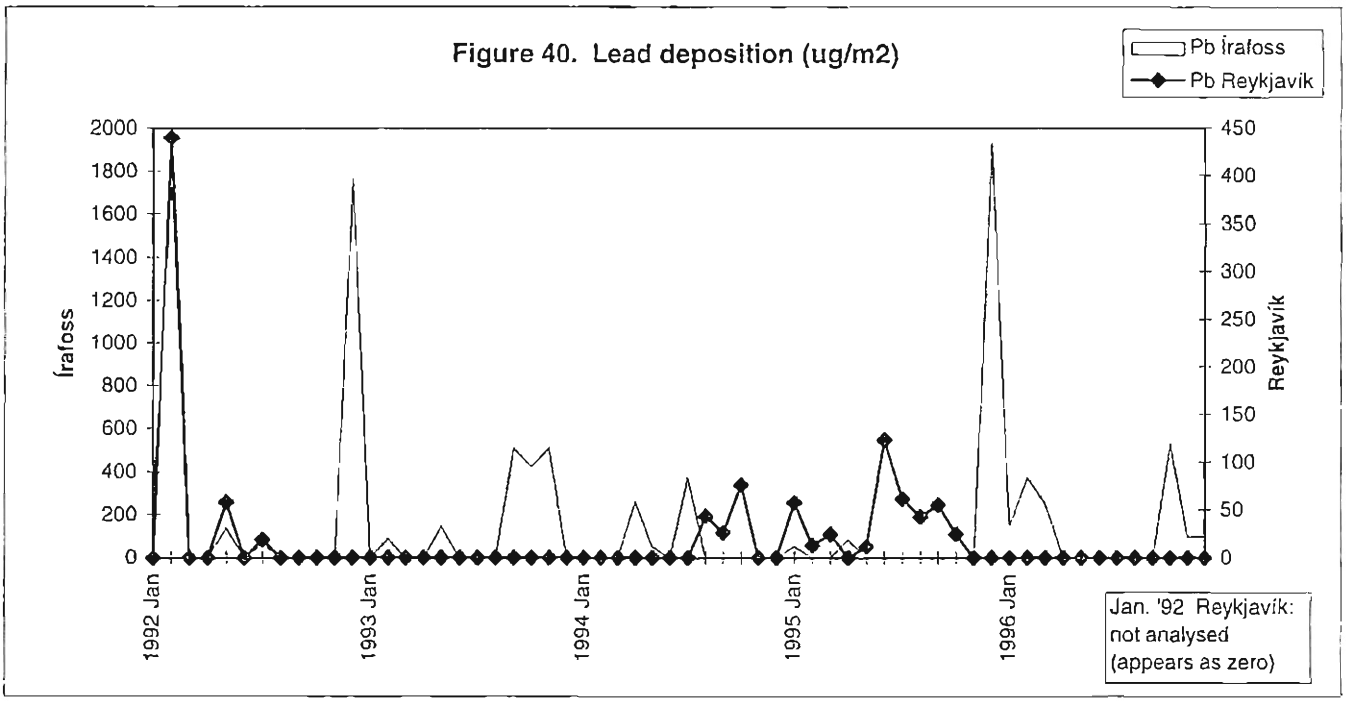
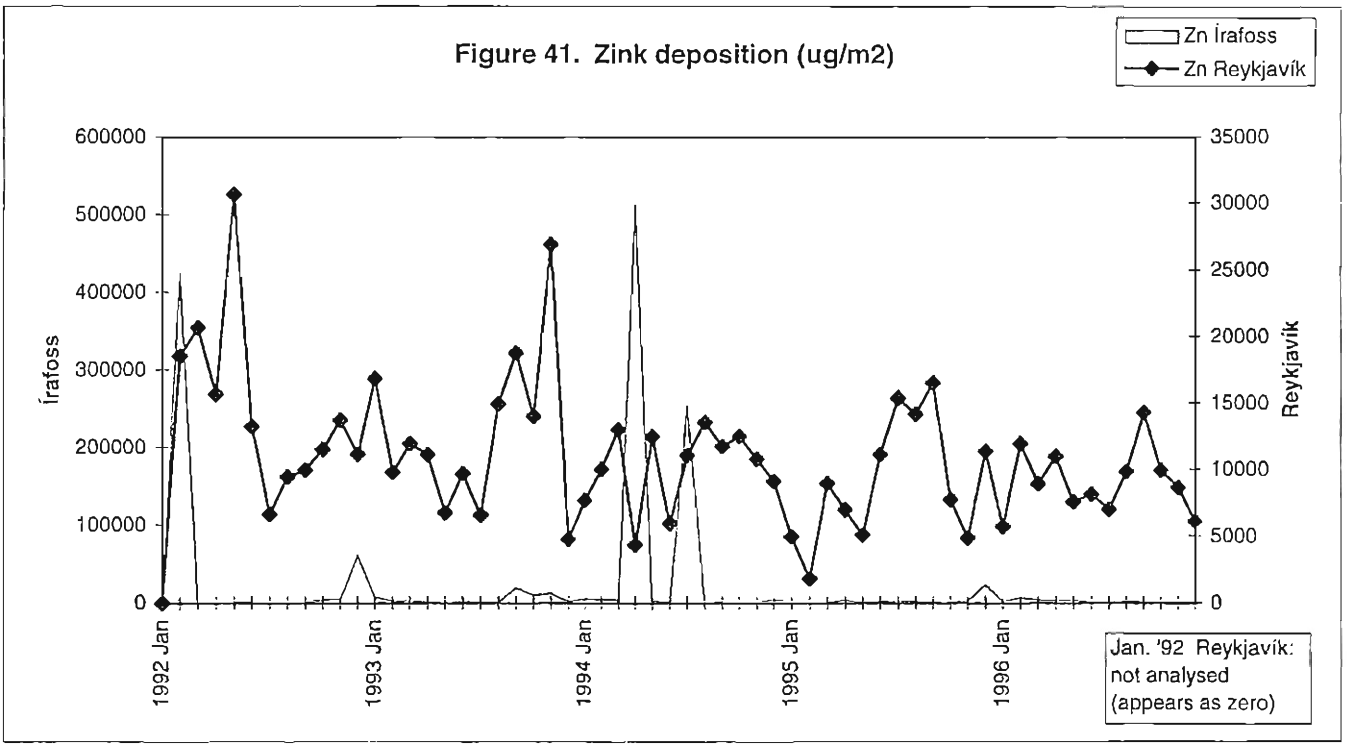


Figure 41. Zink deposition (ug/m2)



Appendix D

Comparison with POPs data from elsewhere

Comparison of the concentration of POPs in air (pg/m3) from three stations:

Spitzbergen (78° 54' N) and *Lista* (58° 06' N) from EMEP/CCC-Report 8/96, arithmetic means (= annual average concentration) for the relevant substances.
Stórhöfði (63° 24' N) from this report, annual average concentration, pp. B6 and B13.

	Spitzbergen 1993	Spitzbergen 1994	Spitzbergen 1995	Lista 1992	Lista 1993	Lista 1994	Lista 1995	* Stórhöfði 1995	Stórhöfði 1996
alpha-HCH	77.43	61.50	62.98	92.76	73.72	64.73	51.87	17.48	15.88
gamma-HCH	14.41	16.06	13.13	86.25	58.52	122.89	64.98	14.38	9.64
o,p'-DDE		1.42	0.22						0.25
p,p'-DDE		1.93	0.87					0.09	0.63
p,p'-DDD		0.09	0.04					1.35	0.76
o,p'-DDT		1.04	0.50						0.58
p,p'-DDT		0.87	0.31					0.19	12.17
HCB	91.86	115.40	99.07	160.14	120.74	94.74	95.21	7.57	6.34
trans-CD	0.53	0.70	0.42	1.37	1.76	1.43		2.42	0.45
cis-CD	1.09	1.20	0.96	1.69	1.42	1.56		1.00	0.71
trans-NO	0.85	0.91	0.67	2.70	1.29	1.38			0.63
dieldrin								0.24	0.75
PCB-28(±16)	4.30	51.39	33.38					6.33	5.08
PCB-31	2.97	45.87	26.54					3.26	3.42
PCB-52	2.47	10.81	6.16					7.12	2.10
PCB-101	1.28	2.06	0.97	67.59	36.03	37.51		1.14	1.02
PCB-105	0.20	0.25	0.11	2.81	1.38	1.28		0	0.39
PCB-118	0.53	0.72	0.33	13.86	8.58	7.75		0.58	1.02
PCB-138	0.54	0.64	0.29	65.32	43.07	39.92		0.57	1.35
PCB-153	0.61	0.62	0.32	51.88	32.79	28.85		0.72	1.78
PCB-156	0.05	0.10	0.02	1.35	1.16	0.96		0	0.11
PCB-180	0.16	0.11	0.07	9.15	6.70	4.71		0.22	0.73
=> gamma-HCH / alpha-HCH	0.19	0.26	0.21	0.93	0.79	1.90	1.25	0.82	0.61
average ratio at each station		0.2			1.2			0.7	

* In the EMEP/CCC-Report 8/96 data from Stórhöfði 1995 was presented as data from "Vestmannaeyjar" station. A more specific name has been choosen and minimal corrections to the data set have led to a slightly different annual average.

POP concentrations (ng/l)	HCH	DDT	7 PCB
Precipitation, August 1994:			
Taimyr Peninsula	0.88	3.2	11.9
Laptev Sea	< 0.1	1.1	1.1
Barents Sea	0.67	0.34	4.3
Weighted mean concentration:			
Stórhöfði 1995	1.2	0.35	0.54
Stórhöfði 1996	0.67	0.23	0.48
Snow, May 1995:			
Taimyr Peninsula	5.61	2.06	5.3

Russian data from AMAP 1997: Arctic Pollution Issues, p. 79.
Icelandic data from this report, pp. B9 and B16.

Deposition of POPs to snow in Canada (1991 - 1994): the range in values from seven arctic stations

	min		max	
HCH	0.12	-	0.88	µg/m2/season
DDT	0.01	-	0.06	µg/m2/season
PCB	0.19	-	0.51	µg/m2/season

Winter deposition at Stórhöfði: 01.10.1995 - 16.05.1996

HCH	0.62	µg/m2/season
DDT	0.12	µg/m2/season
PCB	0.38	µg/m2/season

Canadian data from AMAP 1997: Arctic Pollution Issues, p. 79; units according to D.Gregor (author), personal communication, exact length of season unspecified.

Icelandic data from this report, sum of pp. B10 and B17.