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Acid Rain Research

REPORT 24/1991

RAIN PROJECT
Report for the years 1988, 1989 and 1990

Norwegian Institute for Water Research NIVA

NIVA - REPORT

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Abstract: The RAIN project encompasses 7 years of catchment-scale experiments with acid addition at Sogndal and acid exclusion at Risdalsheia. At Sogndal runoff contains increasingly higher concentrations of SO_4 and NO_3; these are compensated by increasing concentrations of base cations and decreasing alkalinity and pH. In 1989 the first indications of "nitrogen saturation" appeared. At Risdalsheia runoff is now characterized by decreased concentrations of SO_4 and NO_3; these are compensated by decreased concentrations of base cations and increased alkalinity and pH. Runoff is highly acidic because of buffering by organic acids. The soils at Risdalsheia are accumulating base cations and are thus beginning recovery. The trends in runoff chemistry are predicted by MAGIC, a process-oriented model for soil and water acidification. At both sites additional years of treatment are necessary to evaluate the long-term dynamics of acidification and recovery.

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RAIN PROJECT

Report for the years 1988, 1989, and 1990

Richard F. Wright

Oslo, April 1991

Contents

Abstract

The RAIN project now encompasses 7 years of catchment-scale experiments with acid addition at Sogndal and acid exclusion at Risdalsheia. At Sogndal acid addition has caused increasingly higher concentrations of sulfate and nitrate in runoff; these are compensated by increasing concentrations of base cations and decreasing alkalinity and pH. In 1989 after 6 years of nitric acid addition to catchment SOG4, the first indications of incipient "nitrogen saturation" appeared. In 1990 nitrate concentrations were significantly above background levels also in runoff from catchment SOG2, which receives only sulfuric acid.

At Risdalsheia 6 1/2 years of acid exclusion have caused significant changes in runoff chemistry. Sulfate and nitrate concentrations have decreased and are compensated by decreased concentrations of base cations and increased alkalinity and pH. Runoff continues to be strongly acidic because of buffering by high concentrations of organic acids. Input-output budgets indicate that the soils are accumulating base cations and are thus beginning recovery to pre-acidification conditions.

The general trends in runoff chemistry at both Sogndal and Risdalsheia are satisfactorily predicted by MAGIC, a process-oriented model for soil and water acidification. At both sites additional years of treatment are necessary to fully evaluate the long-term dynamics of acidification and recovery.

Preface

A large number of individuals and institutes have cooperated in the RAIN project in 1988, 1989 and 1990. Active scientists included D.F. Brakke, B.J. Cosby, T. Frogner, F. Kroglund, E. Lotse, S.A. Norton, R.A. Parnell, J. Reuss, A. Semb, and R.F. Wright. Technical staff included S. Andersen, H. Efraimsen, M.B. Flaten, B. Hals, R. Høgberget, W. Knudsen, M. Lie, J. Lilletvedt, T. Mindrebø, T.J. Oredalen, A. Rogne, and I.J. Rørstad. NIVA, NILU and the Department of Soil Sciences, SLU, provided technical support.

The RAIN project would not be possible without the generous cooperation of landowners at both sites. We thank N. Knagenhjelm, Sogn Televerk, and Arendal Televerk for permission to use private roads. N. Dalaker, H. Haukås, and A. Risdal provided local assistance. G. Indgjerd, R. Kråkenes, A. Johnsen, S.R. Johnsen, Ø. Johnsen, and T. Stokke assisted with sampling at Sogndal.

Financial support came from the Norwegian Ministry of Environment (in part through the National Committee for Environmental Research at the Norwegian Council for Arts and Science), The Royal Norwegian Council for Scientific and Industrial Research, Environment Canada, the Ontario Ministry of Environment, the Swedish Environmental Protection Board, the Central Electricity Generating Board (UK), National Power (UK), and from internal research funds from NILU and NIVA.

Several auxiliary projects were associated with the RAIN project during 1988-90. These include modelling the acidification process (N. Christophersen, principal investigator), weathering studies in conjunction with project RAIN (R. F. Wright and E. Lotse, co-principal investigators) (both financed by the Surface Water Acidification Programme (SWAP) (The Royal Society, the Norwegian Academy of Science and Letters, and the Royal Swedish Academy of Sciences), fish studies in conjunction with project RAIN (financed by the Central Electricity Generating Board and National Power, F. Kroglund, principal investigator), a study of aluminum in soils (R.A. Parnell, principal investigator), and heavy metals in soils and vegetation (financed by the Royal Norwegian Council for Scientific and Industrial Research and the Swedish National Environmental protection Board, E. Steinnes, principal investigator). One dr. scient. student (T. Frogner) was associated with the RAIN project under a fellowship from the Royal Norwegian Council for Scientific and Industrial Research.

1. Introduction

International agreements to substantially reduce emissions of acidifying compounds are in part based on the premise that such reductions will restore acidified soils and waters. The RAIN Project (Reversing Acidification In Norway) aims to provide direct experimental evidence for the magnitude and rate of reversibility by manipulation of deposition at the catchment scale. The RAIN project comprises two parallel experiments; reduction of acid deposition by means of roof at Risdalsheia, southernmost Norway, and increase in acid deposition at a pristine site at Sogndal, western Norway (Figure 1). The RAIN project began in June 1983 with treatment beginning in June 1984 at Risdalsheia, and April 1984 at Sogndal. The project was extended from the original 5-year duration to 8-years. Although the RAIN project will finish in June 1991, activities at both sites will continue through at least 1991.

Results from the RAIN project are published regularly in NIVAs Acid Rain Report series as well as in the international scientific literature. A complete list of reports and publications from the RAIN project is given in Appendix 11. We report here data for the years 1988, 1989 and 1990. These are the 5th, 6th, and 7th years of treatment at Sogndal, and the 5th, 6th and the first half of the 7th year at Risdalsheia.

2. Sogndal

2.1 Site description

The Sogndal site is located at 900 m elevation and is characterized by gneissic bedrock, thin and patchy soils and alpine vegetation. Details on the soils are given by Lotse and Otabbong (1985).

Four catchments are studied (Figure 2). Catchment SOG2 receives H_2SO_4 at 100 meq/m2/yr (70 meq/m2/yr in 1984), catchment SOG4 receives a 1:1 mixture of H_2SO_4 and HNO_3, while catchments SOG1 and SOG3 serve as untreated controls. Acid is applied as a mist to the snowpack once in April and as 5 portions of 11 mm of pH 3.2 acid during the snowfree period June-October each year (Table 1).

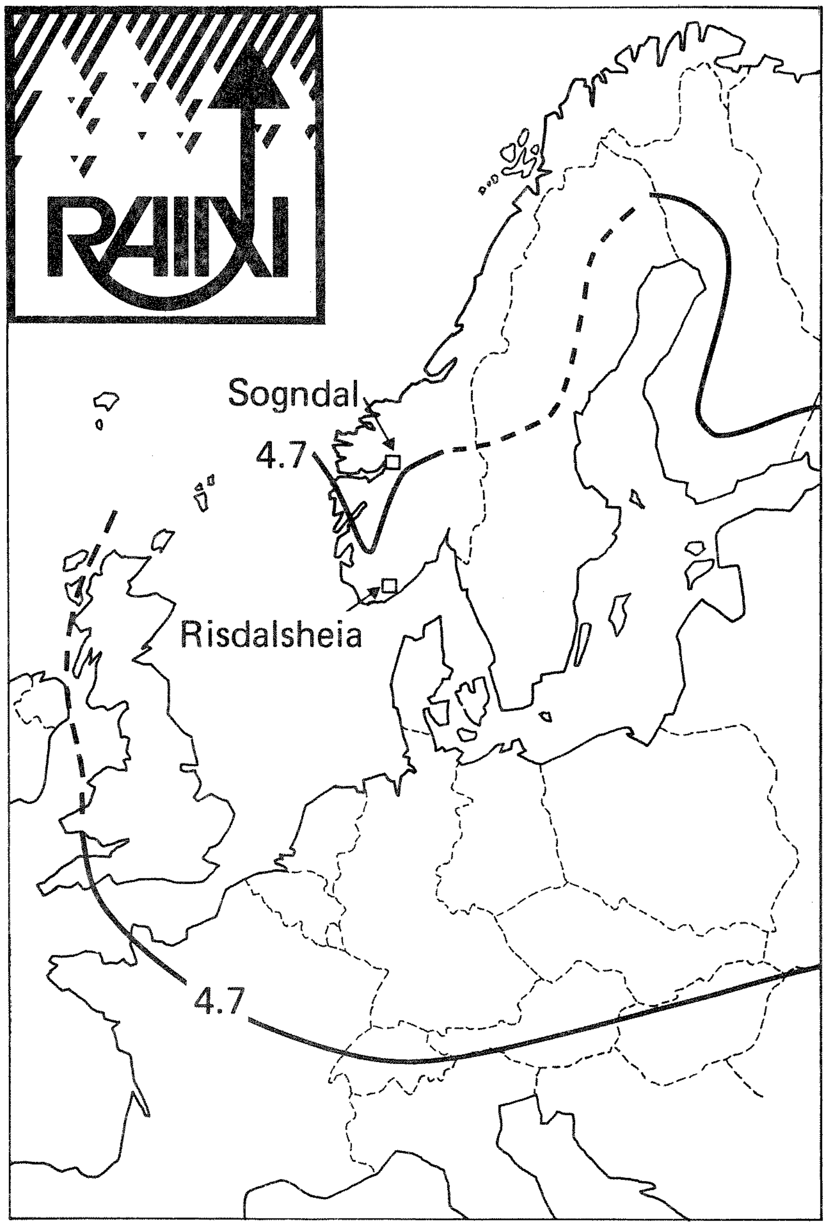

Figure 1. Location of experimental catchments in project RAIN. Areas within the pH 4.7 isoline receive precipitation with a yearly weighted-average pH below 4.7.

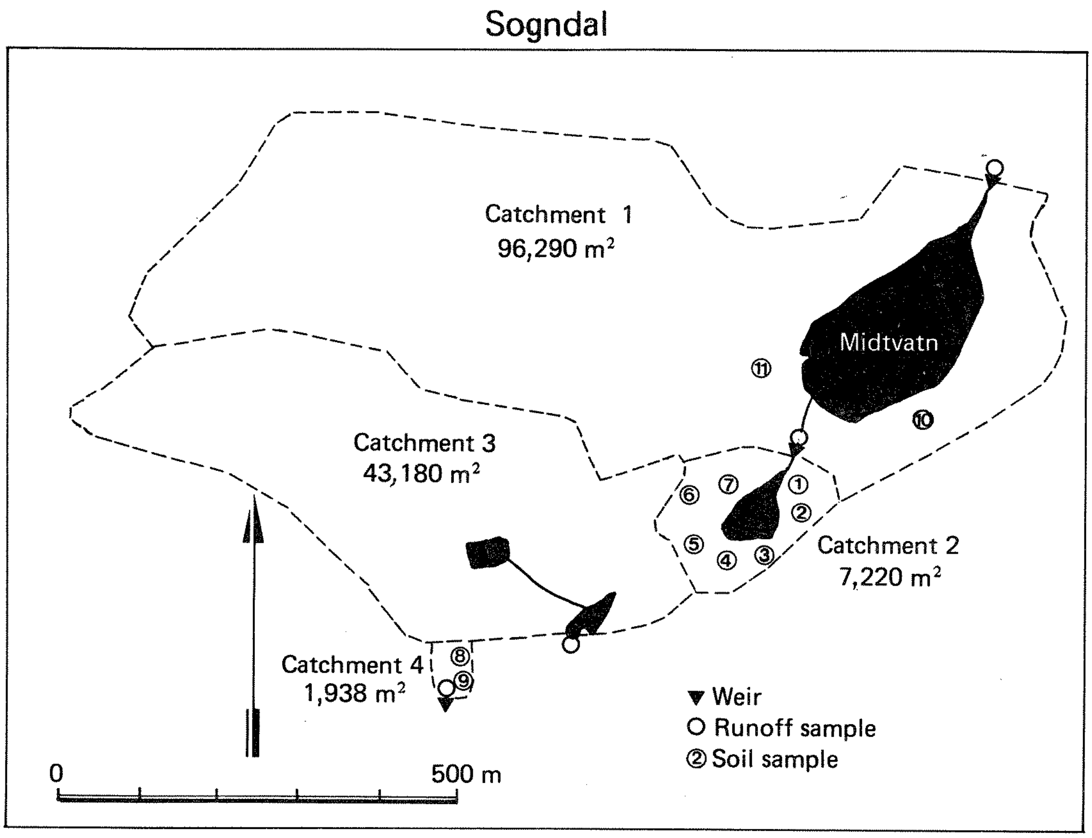

Figure 2. Overview map of the 4 catchments at Sogndal. Catchments 1 and 3 are controls while catchment 2 receives H_2SO_4 and catchment 4 receives H_2SO_4 + HNO_3.

Table 1. Summary of Sogndal treatments through 1989.

SOG2

Date	Pre-treatement Time	mm	Acid application Time	mm	Post treatment Time	mm	Acid dose meq/m² H^+ +	SO_4	NO_3
880415			to snowpack	0.01			45.0	45.0	0
880615	06.30-08.30	4.2	08.30-18.50	22.0	18.50-19.50	2.1	11.2	11.2	0
880730	13.00-14.00	2.2	14.00-17.30	10.7	--	--	11.2	11.2	0
880812	18.00-19.10	2.2	19.10-24.30	11.0	24.30-01.40	2.2	11.2	11.2	0
881003	19.00-20.00	0.8	20.00-24.00	11.0	24.00-01.00	1.4	11.2	11.2	0
	(total added in 1989 meq/m^2: H^+=89.8, Na=2.2, K=0.1, Ca=1.3, Mg=0.6, Cl=1,9, SO_4= 91,5, H_2O=(69,8 mm) = 70 mm)								
890410			to snowpack	0.01			45.0	45.0	0
890715	09.30-11.00	4	11.00-16.00	11	16.00-17.00	2	11.2	11.2	0
890822	11.15-12.15	1.9	02.15-18.15	14.1	-	-	11.2	11.2	0
890823	09.15-09.30	0.6	09.30-15.30	14.6	-	-	11.2	11.2	0
890915	18.30-19.30	2.2	19.30-00.20	11.0	00.20-01.20	2.2	11.2	11.2	0
890928	-	-	11.20-17.00	10.0	17.00-	1.4	11.2	11.2	0
	(total added in 1989 meq/m^2: H^+=101, Na=3.1, K=0.1, Ca=1.1, Mg=0.7, Cl=2.5, SO_4= 102.9, H_2O=77 mm)								
900330			to snowpack				45.0	45.0	0
900721	07.10-08.30	2.2	08.30-13.40	11.0	13.40-14.55	2.4	11.2	11.2	0
900905	--	--	08.50-17.40	22.0	--	--	22.5	22.5	0
900925	13.30-14.45	2.3	14.45-20.00	11.0	20.00-21.15	2.2	11.2	11.2	0
901012			to snowpack				11.2	11.2	0
	(total added in 1990 meq/m^2: H^+=101.1, Na=2.2, K=0.1, Ca=0.8, Mg=0.4, Cl=1.8, SO_4= 102.5, H_2O=53 mm)								

Catchment SOG4

Date	Pre-treatement Time	mm	Acid application Time	mm	Post treatment Time	mm	Acid dose meq/m² H^++	SO_4	NO_3
880416			to snowpack	0.01			45.0	22.5	2.5
880617	22.00-23.00	4.0	23.00-04.30	10.8	04.30-05.30	2.0	11.2	5.6	5.6
880729	18.00-18.44	2.0	18.44-24.00	10.9	24.00-01.00	2.0	11.2	5.6	5.6
880730	07.15-07.30	0.4	07.15-12.30	11.4	12.30-13.30	2.0	11.2	5.6	5.6
880812	10.15-11.00	2.0	11.00-16.00	9.3	16.00-17.00	2.9	11.2	5.6	5.6
881004	07.30-08.00	2.0	08.00-13.00	11.1	13.00-14.00	4.2	11.2	5.6	5.6
	(total added in 1988 meq/m^2: H^+=101, Na=2.6, K=0.1, Ca=1.5, Mg=0.7, Cl=2.2, SO_4= 52.4, NO_3=50.5, H_2O=77 mm)								
890410			to snowpack	0.01			45.0	22.5	22.5
890715	1 1/2 t	1.8	04.45	11.0	= 1 t	1.8	11.2	5.6	5.6
890823	--	--	16.40-20.40	10.8	20.40-21.40	2.6	11.2	5.6	5.6
890824	--	--	06.20-10.20	12.4	10.20-11.20	1.0	11.2	5.6	5.6
890915	1 t	1.8	5 t	11.0	1 t	1.8	11.2	5.6	5.6
890928	-	-	18.00-23.00	10.3	23.00-24.00	1.0	11.2	5.6	5.6
	(total added in 1989 meq/m^2: H^+=101, Na=2.8 K=0.1, Ca=1.0, Mg=0.6, Cl=2.3, SO_4= 52.2, NO_3=50.5, H_2O=67 mm)								
900330			to snowpack				45.0	22.5	22.5
900721	16.00-17.00	2.0	17.00-22.10	10.8	22.10-23.20	2.0	11.2	5.6	5.6
900904	--	--	15.30-00.30	21.7	--	--	22.5	12.3	12.3
900926	0925-1015	2.0	10.15-14.30	10.8	14.30-15.30	2.0	11.2	5.6	5.6
901012			to snowpack				11.2	5.6	5.6
	(total added in 1990meq/m^2: H^+=101.0, Na=2.1 K=0.1, Ca=0.8, Mg=0.4, Cl=1.7, SO_4= 51.9, NO_3=50.5, H_2O=51 mm)								

At Sogndal the sampling program includes (1) volume and chemical composition of weekly samples of bulk precipitation collected at Haukås farm (collected by and analyzed at NILU), (2) continuous gauging of discharge from catchments SOG1, SOG2, and SOG4, (3) chemical composition of runoff from the 4 catchments (daily samples following acid additions, weekly during the snowfree season, monthly during the winter). In additional surveys of soil chemistry have been conducted in 1984, 1985, and 1986 (Lotse and Otabbong 1985, Lotse 1990).

2.2 Results Sogndal 1988-90

The major trends in runoff chemistry observed at Sogndal during the first 4 years of acid addition as reported by Wright et al. (1988a) continued during 1988 and 1989 but not in 1990. Sulfate concentrations continued to increase as expected in 1988 and 1989, but in 1990 levels were much lower although still significantly higher than at the control catchments (Figure 3). The decline in 1990 is probably due to dilution by the extremely heavy snowpack.

Nitrate concentrations showed dramatic increases in 1989 and 1990 at catchment SOG4 (H_2SO_4 + HNO_3) (Figure 3). Nitrate concentrations began to increase above background levels between acid application events. During previous years nitrate concentrations were high only for the immediate few hours following application of acid. The appearance of elevated nitrate concentrations was especially pronounced during the autumn. These data indicate incipient "nitrogen saturation" at catchment SOG4.

Concentrations of non-marine base cations in runoff from the treated catchments remained higher than at the control catchments, but the data for 1988, 1989 and 1990 indicate that these levels are remaining stable (Figure 3). Both 1989 and 1990 were unusually rich in sea-salt inputs due to winter storms in the North Sea. The major decline in non-marine base cations in these years can thus be explained by the "sea-salt effect" by which the sea-salt cations Na and Mg are exchanged for cations such as Al and H^+ in the soils. Although the total concentrations of base cations increased, the concentration of Cl increased relatively more and thus the non-marine fraction of

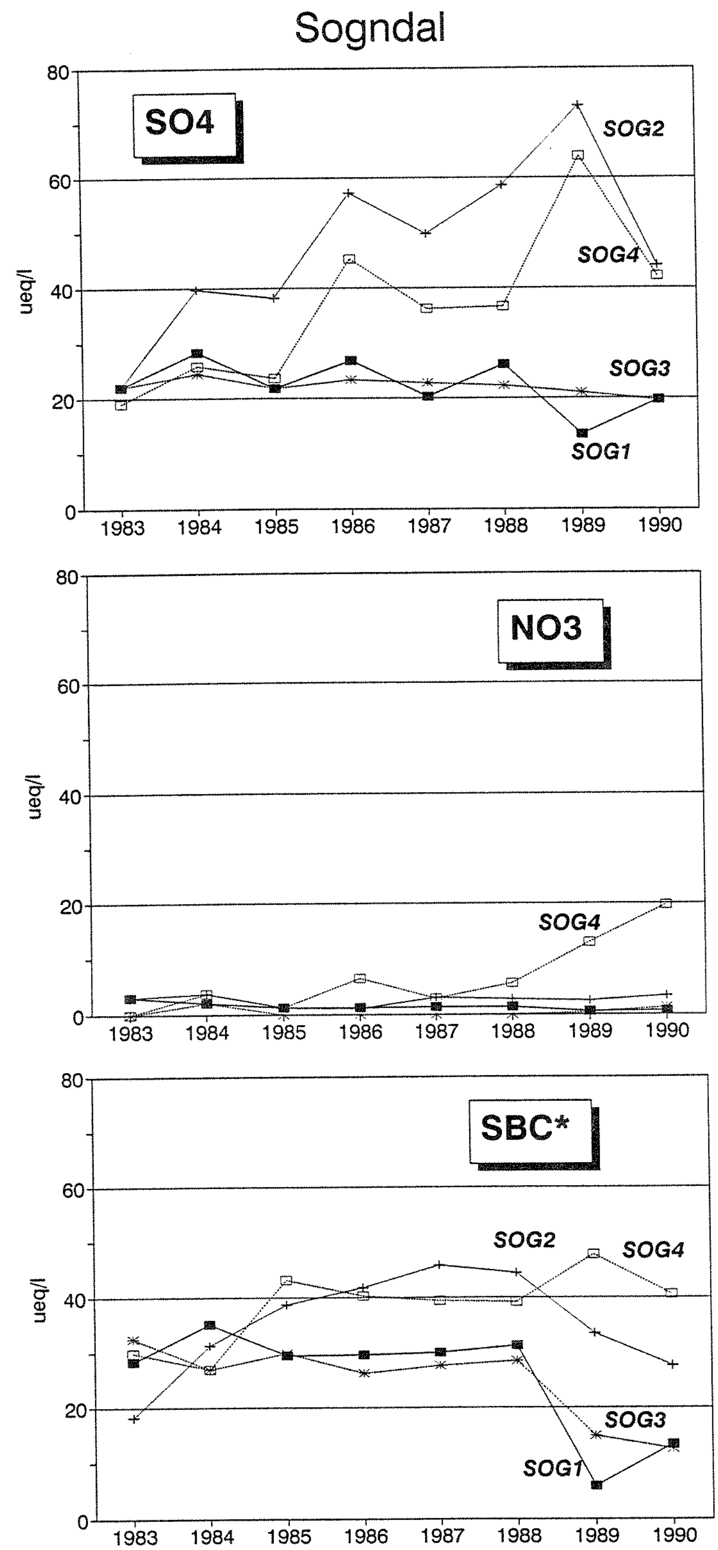

Figure 3. Volume-weighted average concentrations of sulfate (top panel), nitrate (middle panel) and non-marine base cations (lower panel) in runoff at Sogndal. Catchments SOG1 and SOG3 are untreated controls, catchment SOG2 receives H_2SO_4 and catchment SOG4 receives a 1:1 mixture of H_2SO_4 and HNO_3.

Table 2. Input-output budgets for 1988, 1989, and 1990 at Sogndal.

Sogndal fluxes. Year 1988 16.11.87 27.11.88

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	933	767	949	750	933	767	899	710
H+	19.4	1.7	118.8	6.1	19.4	1.3	117.2	4.5
Na	26.9	28.7	26.7	24.9	26.9	22.6	24.3	21.3
K	5.2	1.2	4.9	1.1	5.2	0.8	4.4	1.3
Ca	4.8	16.3	5.6	23.6	4.8	12.6	5.3	19.8
Mg	5.9	8.6	6.1	11.3	5.9	6.7	5.3	7.7
Al	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.4
NH4	10.4	0.0	9.8	0.0	10.4	0.0	9.1	0.0
NO3	10.1	1.4	9.5	2.5	10.1	0.5	59.4	3.6
Cl	28.9	27.6	28.2	24.6	28.9	20.5	25.7	19.9
SO4	19.3	20.4	120.6	43.8	19.3	16.9	68.6	26.2
HCO3	0.0	6.8	0.0	1.2	0.0	6.7	0.0	3.0
Sum +	72.68	56.64	171.78	67.58	72.68	44.07	165.73	54.89
Sum -	58.30	56.17	158.29	72.04	58.30	44.56	153.65	52.74
SBC	42.91	54.83	43.22	60.89	42.91	42.78	39.42	49.99
SSA	58.30	49.35	158.29	70.86	58.30	37.83	153.65	49.75
alk	-15.39	5.48	-115.07	-9.97	-15.39	4.95	-114.23	0.24
TOC	0.0	0.6		0.9		0.5		1.8
SiO2	0.0	2.7		1.3		1.0		1.2

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	933	767	949	750	933	767	899	710
H+	20.8	2.2	125.2	8.2	20.8	1.6	130.3	6.3
Na	28.9	37.4	28.1	33.2	28.9	29.5	27.1	29.9
K	5.6	1.6	5.1	1.4	5.6	1.0	4.9	1.8
Ca	5.2	21.3	5.9	31.5	5.2	16.4	5.9	27.9
Mg	6.4	11.3	6.4	15.0	6.4	8.8	5.9	10.8
Al	0.0	0.2	0.0	0.8	0.0	0.1	0.0	0.6
NH4	11.1	0.0	10.3	0.0	11.1	0.0	10.1	0.0
NO3	10.8	1.8	10.0	3.4	10.8	0.6	66.1	5.1
Cl	30.9	36.0	29.7	32.8	30.9	26.7	28.5	28.0
SO4	20.7	26.6	127.1	58.4	20.7	22.0	76.3	37.0
HCO3	0.0	8.9	0.0	1.6	0.0	8.8	0.0	4.2
Sum +	77.9	73.8	181.0	90.2	77.9	57.4	184.3	77.3
Sum -	62.5	73.2	166.8	96.1	62.5	58.1	170.9	74.3
SBC	46.0	71.5	45.5	81.2	46.0	55.7	43.8	70.4
SSA	62.5	64.3	166.8	94.5	62.5	49.3	170.9	70.1
alk	-16.5	7.1	-121.3	-13.3	-16.5	6.5	-127.0	0.3
TOC	0.0	0.8	0.0	1.2	0.0	0.7	0.0	2.5
SiO2	0.0	3.5	0.0	1.8	0.0	1.3	0.0	1.7

Sogndal fluxes. Year 1989 28.11.88 01.11.89
31-Mar 91

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1684	1677	1422	1292	1684	1677	1450	1250
H+	18	2	115	14	18	4	93	20
Na	71	68	60	64	71	78	67	74
K	5	2	4	2	5	2	5	3
Ca	7	20	6	38	7	23	6	52
Mg	16	17	14	22	16	19	16	23
Al	0	2	0	16	0	1	0	12
NH4	8	0	7	0	8	0	8	0
NO3	10	1	8	3	10	1	59	16
Cl	85	87	73	75	85	87	81	83
SO4	28	22	126	94	28	35	78	80
HCO3	0	4	0	1	0	6	0	6
Sum +	125	111	207	156	125	126	194	184
Sum -	123	114	207	173	123	129	218	185
SBC	99	107	85	126	99	121	94	152
SSA	123	110	207	172	123	127	218	179
alk	-24	-4	-122	-46	-24	-5	-124	-27
TOC	0.0	0.4	0.0	1.0	0.0	0.6	0.0	2.0
SiO2	0	1	0	2	0	1	0	3

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1684	1677	1422	1292	1684	1677	1450	1250
H+	10.7	1.4	80.6	11.0	10.7	2.2	64.2	16.1
Na	42.2	40.3	42.5	49.6	42.2	46.2	46.3	59.3
K	2.9	1.2	3.0	1.7	2.9	1.2	3.1	2.0
Ca	4.2	12.1	4.3	29.6	4.2	13.6	4.4	41.4
Mg	9.6	10.0	9.8	16.8	9.6	11.4	10.8	18.7
Al	0.0	1.3	0.0	12.3	0.0	0.6	0.0	9.5
NH4	4.6	0.0	5.1	0.0	4.6	0.0	5.2	0.0
NO3	6.0	0.6	5.8	2.4	6.0	0.4	40.7	12.9
Cl	50.6	52.0	51.3	57.9	50.6	51.9	56.1	66.4
SO4	16.7	13.3	88.7	73.0	16.7	20.9	53.5	63.9
HCO3	0.0	2.3	0.0	0.8	0.0	3.9	0.0	4.5
Sum +	74.1	66.2	145.4	121.1	74.1	75.3	134.0	147.0
Sum -	73.3	68.2	145.8	134.1	73.3	77.1	150.3	147.8
SBC	58.8	63.6	59.6	97.8	58.8	72.4	64.6	121.4
SSA	73.3	65.9	145.8	133.3	73.3	75.5	150.3	143.2
alk	-14.4	-2.3	-86.1	-35.5	-14.4	-3.1	-85.7	-21.8
TOC	0.0	0.2	0.0	0.8	0.0	0.4	0.0	1.6
SiO2	0.0	0.6	0.0	1.5	0.0	0.9	0.0	2.4

Sogndal fluxes. Year 1990 01.11.89 03.11.90
31-Mar 91

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1382	1449	1124	997	1426	1449	1087	983
H+	13	3	111	8	13	3	112	15
Na	57	62	43	45	59	62	42	47
K	7	2	6	2	7	2	6	2
Ca	12	20	9	23	12	18	9	32
Mg	11	15	9	13	12	15	9	15
Al	0	0	0	5	0	2	0	5
NH4	10	0	9	0	8	0	9	0
NO3	10	1	8	3	9	2	59	19
Cl	68	72	50	51	71	71	48	51
SO4	25	29	123	44	23	28	72	41
HCO3	0	5	0	1	0	11	0	2
Sum +	110	102	187	97	110	102	185	116
Sum -	102	106	181	99	102	112	179	114
SBC	88	99	67	84	89	96	65	97
SSA	102	101	181	98	102	105	179	112
alk	-14	-2	-114	-14	-14	-9	-114	-15
TOC	0	1	0	1	0	1	0	2
SiO2	0	1	0	1	0	1	0	1

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1382	1449	1124	997	1426	1449	1087	983
H+	9.0	1.8	98.7	7.5	9.1	2.4	102.9	14.9
Na	41.4	42.9	38.4	45.5	41.2	42.6	38.4	48.2
K	5.3	1.4	5.1	2.0	4.6	1.3	5.1	2.4
Ca	8.5	13.6	8.4	23.6	8.1	12.4	8.4	32.3
Mg	8.2	10.2	7.7	13.3	8.1	10.4	7.8	15.3
Al	0.0	0.1	0.0	5.3	0.0	1.1	0.0	4.6
NH4	7.0	0.0	7.7	0.0	5.6	0.0	7.8	0.0
NO3	6.9	0.7	7.4	3.3	6.1	1.2	54.0	19.7
Cl	48.9	49.4	44.7	51.2	49.4	48.7	44.5	52.1
SO4	17.8	19.7	109.3	43.9	16.2	19.6	66.1	41.9
HCO3	0.0	3.3	0.0	1.1	0.0	7.9	0.0	2.3
Sum +	79.5	70.1	165.9	97.2	76.8	70.1	170.3	117.8
Sum -	73.6	73.1	161.3	99.4	71.7	77.4	164.6	116.0
SBC	63.5	68.2	59.6	84.4	62.1	66.6	59.6	98.3
SSA	73.6	69.8	161.3	98.4	71.7	72.7	164.6	113.8
alk	-10.1	-1.6	-101.7	-14.0	-9.7	-6.1	-105.0	-15.5
TOC	0.0	0.4	0.0	0.8	0.0	0.5	0.0	2.3
SiO2	0.0	0.8	0.0	1.4	0.0	0.8	0.0	1.5

base cations shows a slight decrease. The "seasalt effect" was demonstrated experimentally at Sogndal in 1987 (Wright et al. 1988b).

As a consequence of the increasing concentrations of strong acid anions SO_4 and NO_3 and relatively constant levels of base cations, the alkalinity and pH at the acid addition catchments continued to decline in 1988, 1989, and 1990 (Figure 4). Weighted-average alkalinity was negative at both SOG2 (H_2SO_4) and SOG4 (H_2SO_4 + HNO_3). Alkalinity at the two control catchments in 1989 and 1990 was about zero, the lowest of level for the 8 years of measurement, probably due to the "seasalt effect".

pH also continued to decline and in 1989 the weighted-average pH (calculated from H^+ concentrations) was below 5 for both catchments SOG2 and SOG4 for the first time (Figure 4).

The input-output budgets indicate that in 1988, 1989 and 1990 both catchments SOG2 and SOG4 continue to retain sulfate, albeit at lower rates than in previous years (Table 2). This pattern is consistent with sulfate adsorption in the soils as the major process by which sulfate is retained.

2.3 Discussion Sogndal

The changes in runoff chemistry during the 7 years of experimental acid addition at Sogndal generally confirm the trends predicted by empirical and process-oriented models. The data roughly fit the empirical acidification model Henriksen (1980) relating changes in concentrations of non-marine calcium and magnesium to changes in non-marine sulfate (Figure 5). Here the F-factor (delta Ca^*+Mg^* / delta SO_4^*+NO_3) is about 0.4 at catchment SOG2 and 0.3 at catchment SOG4. The F-factor has varied from year-to-year with a generally decreasing trend. These F-factors are higher than the value of 0.12 obtained from the empirical formula suggested by Henriksen et al. (1988). At Sogndal the F-factor can be expected to continue to decline with further years of acid addition; the concentrations of base cations should decrease as the pool of exchangeable base cations in the soils is slowly depleted.

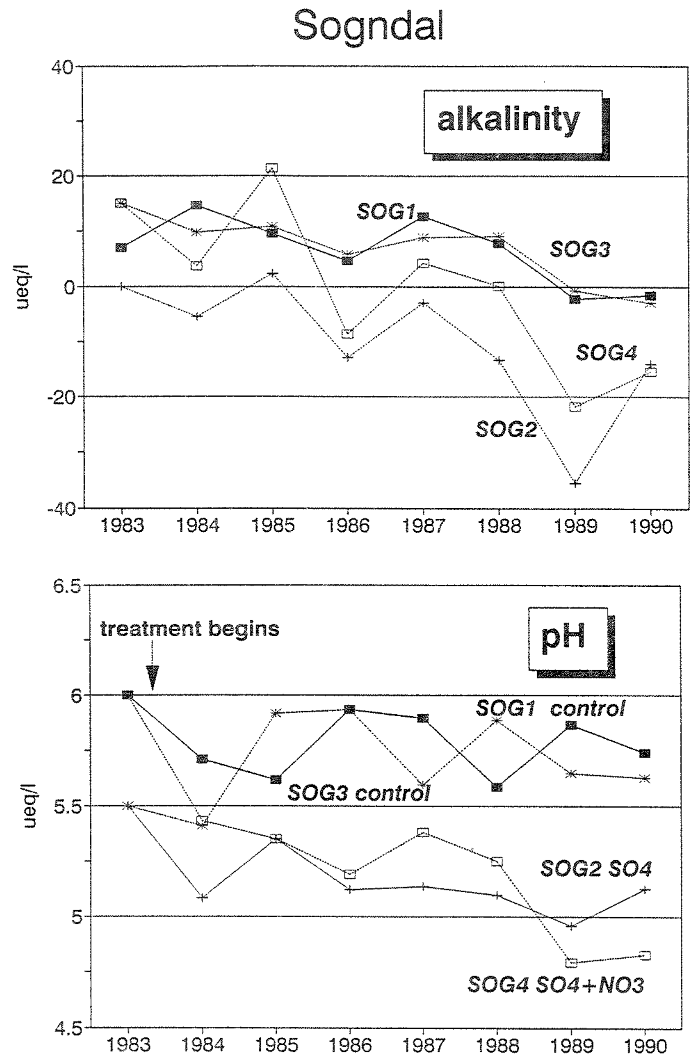

Figure 4. Volume-weighted average concentrations of alkalinity (defined as difference between sum of base cations minus sum of strong acid anions) (top panel) and pH (lower panel) in runoff at Sogndal. Catchments SOG1 and SOG3 are untreated controls, catchment SOG2 receives H_2SO_4 and catchment SOG4 receives a 1:1 mixture of H_2SO_4 and HNO_3.

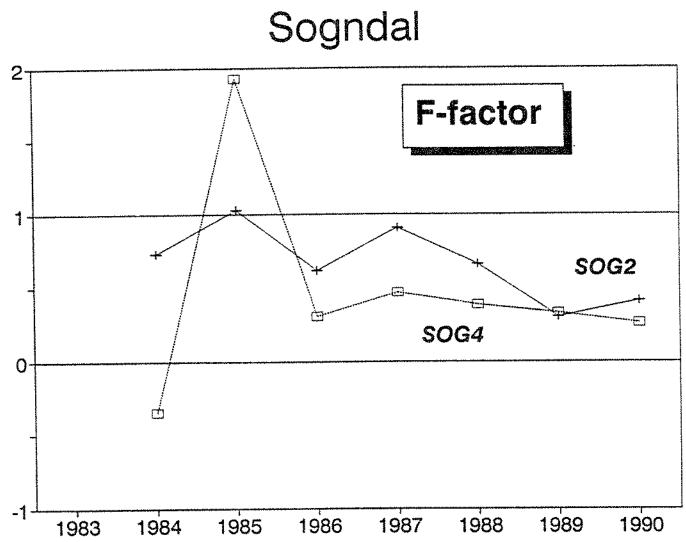

Figure 5. F-factor (delta $Ca^* + Mg^*$ / delta $SO_4^* + NO_3$) for volume-weighted concentrations in runoff at the treated Sogndal catchments. The F-factor is calculated with respect to the pre-treatment year in all cases.

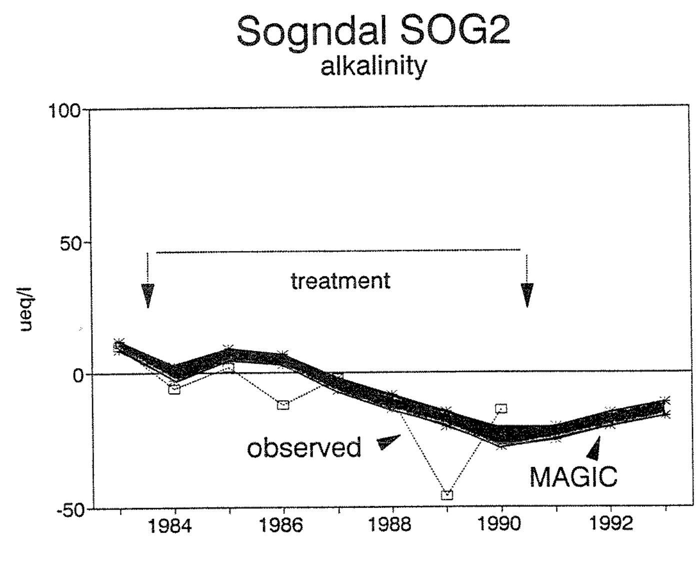

Figure 6. Alkalinity in runoff at Sogndal catchment SOG2 (H_2SO_4) measured and predicted by MAGIC, a process-oriented acidification model. The bands in MAGIC predictions reflect uncertainty in parameters used by the model (modified from Wright et al. 1990).

The data from Sogndal have also been used to evaluate the MAGIC model (Wright et al. 1990). MAGIC (Model for Acidification of Groundwater In Catchments) (Cosby et al. 1985a, 1985b) is a process-oriented model at the catchment scale for simulating acidification of soils and surface waters on time scales of years-to-decades. The application of MAGIC to the first 4-years of treatment data first entailed calibration of the model to the data from the control catchments SOG1 and SOG3, and then simulation of the H_2SO_4 acid addition experiment at SOG2 by changing deposition and predicting changes in runoff chemistry (Wright et al. 1990). Measured monthly values for deposition of major ions at SOG2 catchment were used to drive the model, thus taking into account the month-to-month fluctuations in water flux, snow accumulation and melt, and inputs of seasalts. To evaluate the effects of uncertainty in the data and the model parameters the model was calibrated several times to produce ranges for the predicted chemistry.

The additional two years of treatment data generally follow the trends predicted by MAGIC (Figure 6). Here the actual monthly deposition data for 1988-90 have not been used to drive the model. Thus the predicted alkalinity bands for these years may differ somewhat from those shown on Figure 6.

Runoff data for 1989 and 1990 point to changes in nitrogen cycling at both experimental catchments at Sogndal as a result of acid addition. At catchment SOG4 which receives 50 $meq/m^2/yr$ HNO_3 nitrate concentrations in runoff increased dramatically in 1989 and 1990 (Figure 3). Here nitric acid addition has apparently induced incipient "nitrogen saturation". Several explanations are possible: (1) not all the incoming nitrogen is retained in the soil because biological uptake is insufficiently rapid especially in the autumn when the growing season is over, (2) acid addition has acidified the soil or caused some other alteration such that decomposition of soil organic matter is accelerated with release of nitrate to soil solution and runoff.

In 1990 the data for catchment SOG2 (H_2SO_4 addition) indicate that also here acid addition has caused a change in nitrogen cycling (Figure 7). Nitrate levels in runoff during the summer 1990 were significantly higher than previous years and than at the 2 control catchments. Catchment SOG2 does not receive nitric acid and thus the

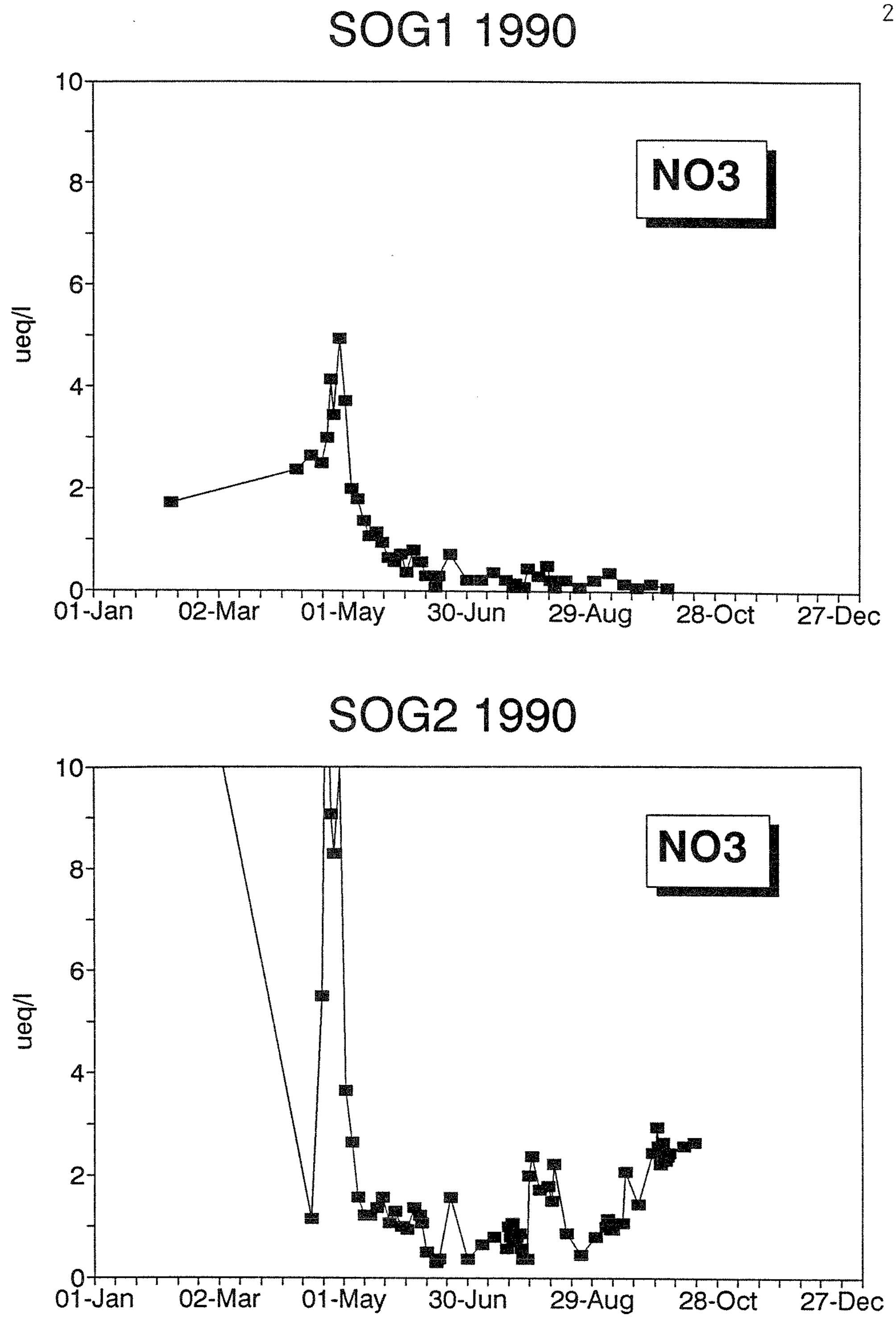

Figure 7. Nitrate concentrations in runoff samples collected in 1990 at catchments SOG1 (control) and SOG2 (H_2SO_4). Concentrations at SOG2 began to increase above background levels in 1990 perhaps reflecting changes in nitrogen cycling in the catchment as a result of 7 years of sulfuric acid addition.

increased output of nitrate must reflect a change in the internal cycling, possibly due to the acidification of the soils by 7 years of sulfuric acid addition.

3. Risdalsheia

3.1 Site description

The Risdalsheia site is located at 300 m elevation and is characterized by granitic bedrock, thin and patchy soils and a sparse forest of pine and birch. Details on the soils are given by Lotse and Otabbong (1985).

Three catchments are studied (Figure 8, Table 3). KIM receives clean rain beneath the roof, EGIL receives recycled acid rain beneath the roof, and ROLF has no roof and receives ambient acid rain.

Table 3. Overview of the experimental catchments at Risdalsheia.

	KIM roof, clean rain	EGIL roof, acid rain	ROLF no roof, acid rain
Catchment area	856 m^2	398 m^2	220 m^2
Roof area	1165 m^2	650 m^2	---

At Risdalsheia the sampling program includes (1) volume and chemical composition of weekly samples of bulk precipitation under the roof at KIM catchment (clean rain) and outside (ambient acid rain) (analyzed at NILU), (2) continuous gauging of discharge from all three catchments, (3) chemical composition of runoff from the 4 catchments (weekly, more frequently during periods of high discharge and less frequently during the winter). In addition surveys of soil chemistry have been conducted in 1984, 1985, and 1986 (Lotse and Otabbong 1985, Lotse 1990).

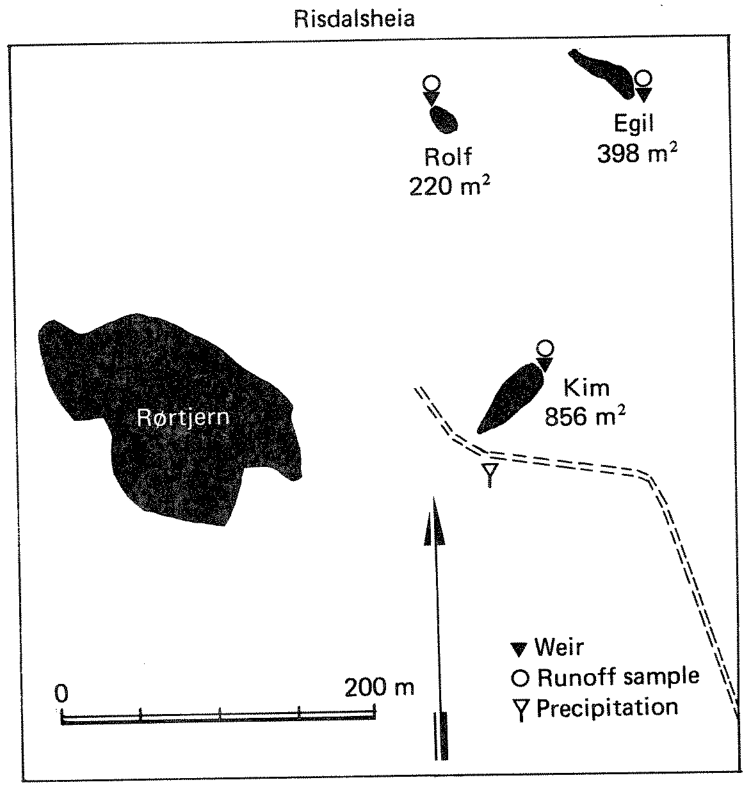

Figure 8. Overview of the 3 catchments at Risdalsheia. KIM and EGIL are covered by roofs; KIM receives clean precipitation while EGIL receives recycled ambient acid precipitation. ROLF has no roof and serves as reference. Water supply for snowmaking is the pond Rørtjern.

3.2 Results Risdalsheia 1988, 1989, and first half of 1990

June 1990 marked 6 full years of acid exclusion at KIM catchment at Risdalsheia. Input-output budgets and volume-weighted annual concentrations are here calculated on the basis of treatment year from June-to-June. These values thus differ slightly from the November-to-November figures given in Wright et al. (1988a).

The major changes in runoff chemistry observed during the first 4 years of treatment have generally continued during 1988, 1989, and the first half of 1990. Concentrations of sulfate have continued to decrease to about 40-50 μeq/l in runoff at KIM catchment (roof, clean rain) (Figure 9). Both EGIL (roof, acid rain) and ROLF (no roof, acid rain) catchments have about 100 μeq/l in runoff. Input-output budgets suggest that the catchment is still bleeding a small amount of old sulfate, although difficulties in estimating the of dry deposition of sulfate make this conclusion uncertain (Table 4).

Nitrate and ammonium (not shown) concentrations in runoff at KIM catchment have remained low since the onset of treatment in 1984, except for a few short periods of associated with technical failure of the ion exchange system (Figure 9).

Base cation concentrations have also continued to remain low during 1988-90 (Figure 9). This decrease is probably due in part to the lower concentrations of mobile anions in runoff, but also reflects the regeneration of the pool of exchangeable base cations on the soil.

Alkalinity (as defined as difference in sum of base cations including ammonium and sum of strong acid anions) has continued to increase during 1988-90 and is now about -30 to -20 μeq/l (Figure 10). The two catchments receiving ambient acid rain have decidedly lower alkalinity.

Despite the decrease in strong acid anions and increase in alkalinity, pH has not increased dramatically (Figure 10). For the 6th year of treatment 1989-90 the annual average pH at KIM catchment was about 4.3 while the 2 acid catchments had pH levels of about 4.0 and 4.1.

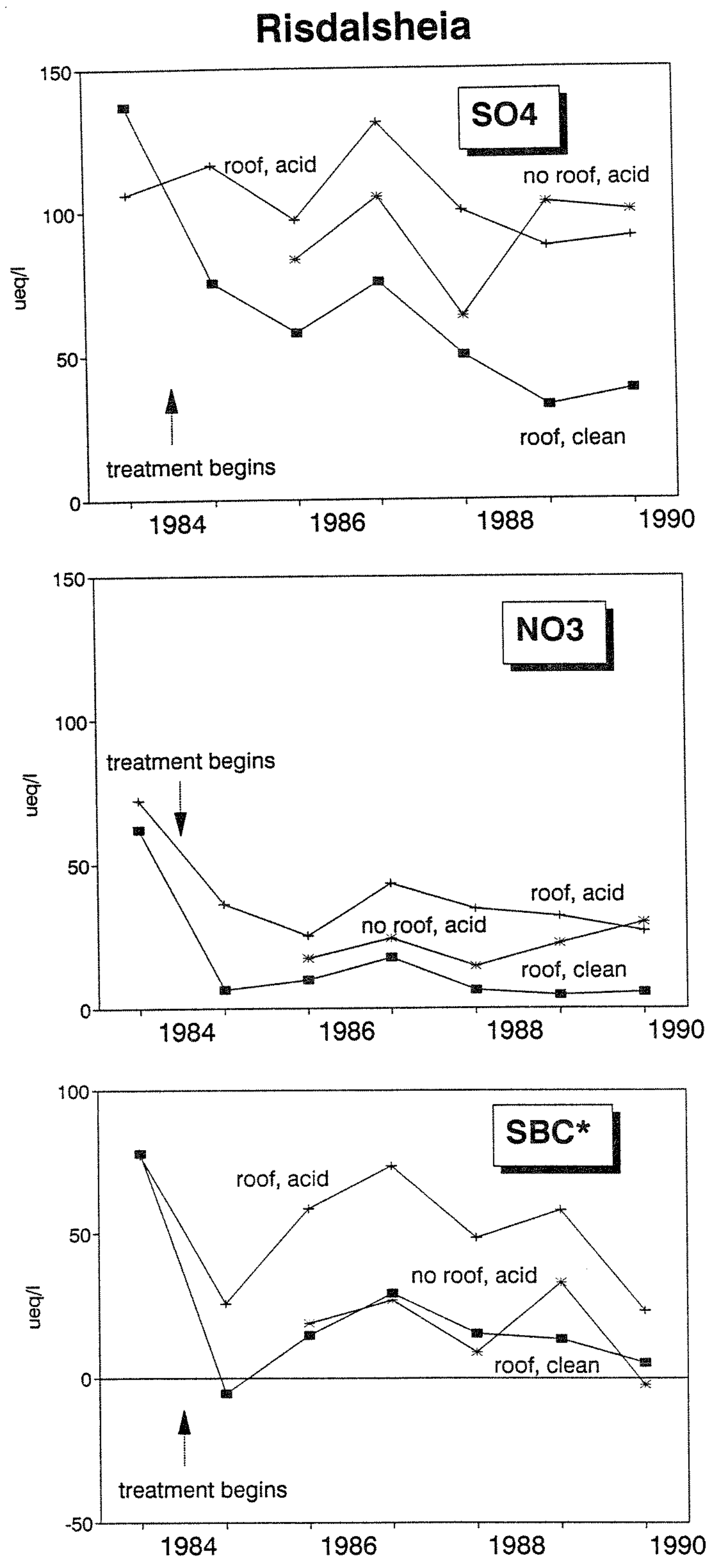

Figure 9. Volume-weighted average concentrations of sulfate (top panel), nitrate (middle panel) and non-marine base cations (lower panel) in runoff at Risdalsheia.

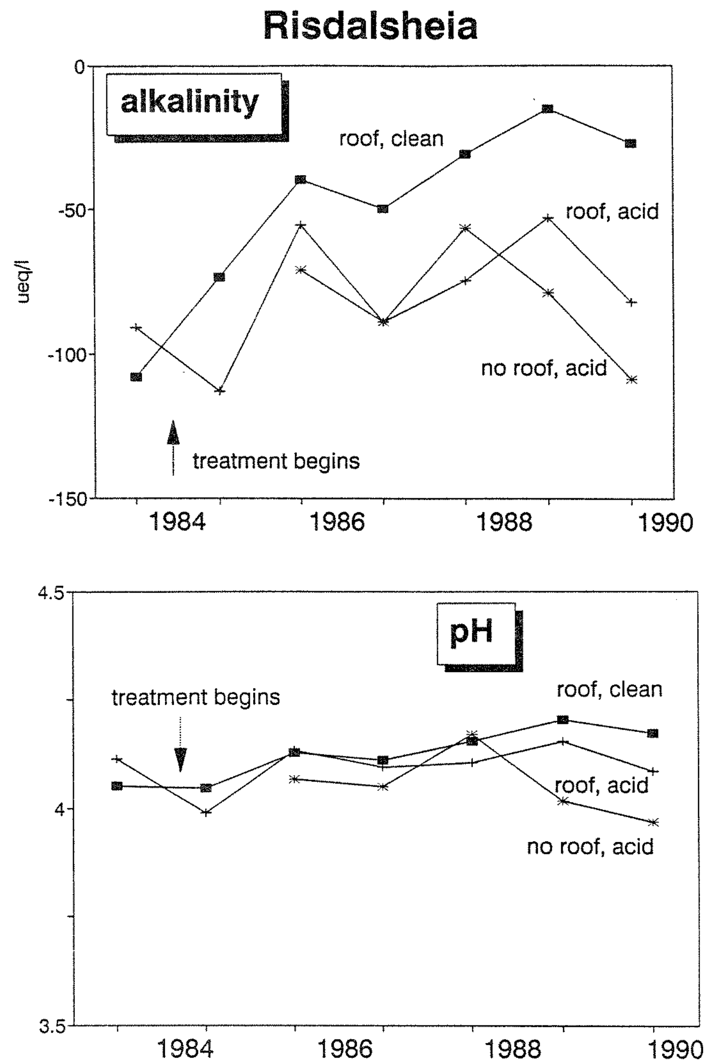

Figure 10. Volume-weighted average concentrations of alkalinity (defined as difference between sum of base cations minus sum of strong acid anions) (top panel) and pH (lower panel) in runoff at Risdalsheia.

Table 4. Input-output budgets for 1987-88, 1988-89, and 1989-90 at Risdalsheia.

Risdalsheia input-output budgets Units: meq/m2/yr.
87-88 26-11-87 to 25-11-88

	EGIL		KIM		ROLF	
	In	Out	In	Out	In	Out
H2O	1366	1235	997	903	1935	1735
H+	90.2	86.5	27.0	55.4	139.2	135.9
Na	71.4	81.2	61.4	53.7	130.6	158.0
K	4.0	6.6	1.4	4.0	5.7	7.0
Ca	11.3	18.8	4.6	7.6	17.2	22.0
Mg	17.5	23.3	14.1	11.7	32.0	34.6
Al	0.0	13.5	0.0	8.0	0.0	14.2
NH4	47.7	28.1	5.2	6.7	78.2	19.9
NO3	58.9	37.6	14.4	4.1	90.2	34.5
Cl	83.1	83.1	68.1	62.2	148.0	148.0
SO4	80.1	102.4	22.5	30.1	138.4	146.0
A-	20.0	34.9	8.7	50.7	26.3	63.1
sum+	242.1	258.0	113.7	147.1	402.9	391.6
sum-	242.1	258.0	113.7	147.1	402.9	391.6
SBC	151.9	158.0	86.7	83.7	263.7	241.5
SSA	222.1	223.1	105.0	96.4	376.6	328.5
alk	-70.2	-65.1	-18.3	-12.7	-112.9	-87.0
TOC		12.9		14.0		20.3
SiO2		2.1		1.9		2.5
c.d.		2.7		3.6		3.1

concentrations Units: ueq/l.
87-88

	EGIL		KIM		ROLF	
	In	Out	In	Out	In	Out
pH	4.18	4.15	4.57	4.21	4.14	4.11
H+	66.0	70.0	27.1	61.4	72.0	78.4
Na	52.2	65.7	61.5	59.5	67.5	91.1
K	3.0	5.3	1.4	4.4	2.9	4.0
Ca	8.3	15.2	4.6	8.4	8.9	12.7
Mg	12.8	18.9	14.1	13.0	16.5	19.9
Al	0.0	10.9	0.0	8.9	0.0	8.2
NH4	34.9	22.8	5.2	7.4	40.4	11.5
NO3	43.1	30.4	14.4	4.5	46.6	19.9
Cl	60.8	67.3	68.3	68.9	76.5	85.3
SO4	58.6	82.9	22.6	33.3	71.5	84.2
A-	14.6	28.3	8.7	56.1	13.6	36.4
sum+	177.2	208.9	114.0	162.9	208.2	225.8
sum-	177.2	208.9	114.0	162.9	208.2	225.8
SBC	111.2	127.9	86.9	92.7	136.3	139.2
SSA	162.6	180.6	105.3	106.8	194.7	189.4
alk	-51.4	-52.7	-18.4	-14.1	-58.4	-50.2
TOC		10.4		15.5		11.7
SiO2		1.7		2.1		1.4
c.d.		2.2		4.0		1.8

Risdalsheia input-output budgets   Units: meq/m2/yr.
88-89 25-11-88 to 24-11-89

	EGIL		KIM		ROLF	
	In	Out	In	Out	In	Out
H2O	970	1005	1033	939	1080	934
H+	78.4	76.5	25.3	63.6	81.1	98.5
Na	76.5	81.3	69.6	70.4	146.0	137.8
K	4.0	6.8	1.6	6.7	5.2	5.7
Ca	10.1	18.0	4.1	8.1	13.6	18.7
Mg	19.2	23.3	16.9	12.8	35.0	33.8
Al	0.0	15.1	0.0	9.6	0.0	20.5
NH4	24.1	26.2	5.6	5.5	47.5	5.5
NO3	43.4	33.1	13.0	5.1	66.5	28.6
Cl	89.7	89.7	85.5	85.5	171.2	171.2
SO4	82.9	98.8	24.2	37.3	94.2	100.2
A-	-3.8	25.6	0.4	48.8	-3.6	20.5
sum+	212.2	247.2	123.1	176.7	328.3	320.5
sum-	212.2	247.2	123.1	176.7	328.3	320.5
SBC	133.8	155.6	97.8	103.5	247.2	201.5
SSA	216.0	221.6	122.7	127.9	331.9	300.0
alk	-82.2	-66.0	-24.9	-24.4	-84.7	-98.5
TOC		10.8		12.8		6.9
SiO2		2.4		2.2		1.9
c.d.		2.4		3.8		3.0

concentrations   Units: ueq/l.
88-89

	EGIL		KIM		ROLF	
	In	Out	In	Out	In	Out
pH	4.09	4.12	4.61	4.17	4.12	3.98
H+	80.8	76.1	24.5	67.7	75.1	105.5
Na	78.8	80.9	67.4	75.0	135.1	147.5
K	4.1	6.8	1.5	7.1	4.8	6.1
Ca	10.4	17.9	4.0	8.6	12.6	20.0
Mg	19.8	23.2	16.3	13.6	32.4	36.2
Al	0.0	15.0	0.0	10.2	0.0	21.9
NH4	24.8	26.1	5.4	5.9	44.0	5.9
NO3	44.7	32.9	12.6	5.4	61.6	30.6
Cl	92.5	89.3	82.8	91.1	158.5	183.3
SO4	85.5	98.3	23.4	39.7	87.2	107.3
A-	-3.9	25.5	0.4	52.0	-3.3	21.9
sum+	218.8	246.0	119.1	188.2	303.9	343.1
sum-	218.8	246.0	119.1	188.2	303.9	343.1
SBC	138.0	154.8	94.6	110.2	228.8	215.7
SSA	222.7	220.5	118.7	136.2	307.2	321.2
alk	-84.7	-65.7	-24.1	-26.0	-78.4	-105.5
TOC		10.7		13.6		7.4
SiO2		2.4		2.3		2.0
c.d.		2.4		4.1		3.2

The relatively minor change in pH is largely explained by the increasing role of organic anions. The runoff from these three small catchments contains high amounts of organic carbon with TOC levels of about 5-20 mgC/l (Figure 11). The catchments have intrinsic differences in TOC levels; KIM (roof, clean rain) has somewhat higher levels than do EGIL (roof, acid rain) and ROLF (no roof, acid rain).

The acid exclusion treatment has not changed the TOC levels significantly. At KIM catchment the first 2 years of treatment have higher TOC levels because of the relatively low flux of water these years. During the following years 1986-90 TOC levels have remained about 13-15 mgC/l. These trends are also exhibited by the other two catchments.

The concentrations of organic anions in runoff from KIM catchment have increased steadily as the acid exclusion experiment has progressed (Figure 11). Organic anions are calculated by difference from the ionic balance. Levels in 1988-90 are now about 40-50 μeq/l. Concentrations of organic anions have apparently not changed at either of the two other catchments.

Because the concentrations of organic anions is increasing but the concentration of TOC remains relatively constant, the charge density (μeq/mgC) has increased over the 6 years of experiment. These trends can be explained by increasing dissociation of organic acids in runoff at KIM catchment. Although the TOC is undoubtedly a complicated mixture of humic and fulvic compounds of various acidities, the data are consistent with an organic acid of pK about 4.0 and maximum charge density of about 4.5 μeq/mgC (Wright 1989).

3.3 Discussion Risdalsheia

The changes in runoff chemistry during the 6 years of acid exclusion treatment at KIM catchment (roof, clean) also generally confirm the trends predicted by empirical and process-oriented models. The data roughly fit the empirical acidification model of Henriksen (1980) (Figure 12). Here the F-factor (delta Ca*+Mg* / delta SO4*) is about 0.2, but has varied from year-to-year with a generally decreasing trend (Figure

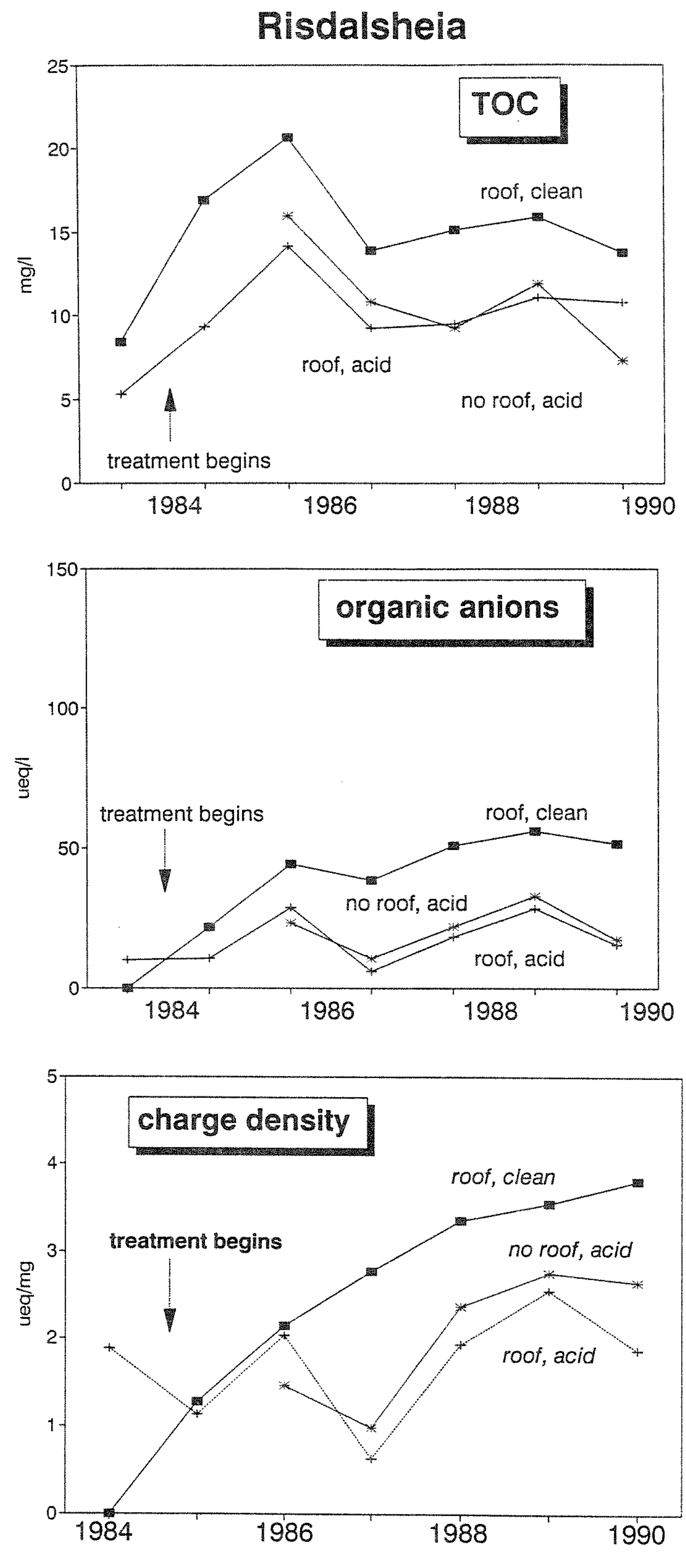

Figure 11. Volume-weighted average concentrations of total organic carbon (TOC) (top panel), organic anions (defined as difference between sum of measured cations and sum of measured anions (middle panel) and charge density (defined as organic anions divided by TOC (lower panel) in runoff at Risdalsheia.

12). This F-factor is higher than the value of 0.10 obtained from the empirical formula suggested by Henriksen et al. (1988).

At Risdalsheia the F-factor can be expected to continue to decline with further years of acid exclusion; concentrations of non-marine sulfate are nearly in steady-state with outputs approximately equal to inputs, but the concentrations of base cations should increase somewhat as the pool of exchangeable base cations in the soils slowly increases.

The increasing role of organic acids at Risdalsheia agrees with a recently-developed empirical model relating pH, DOC, ANC (acid neutralizing capacity), and concentrations of organic acids in acidified waters (Figure 13) (Munson et al. 1990). This empirical nomograph was developed on the basis of water chemistry data from 1400 lakes in the Adirondack region of New York, USA, using an approach similar to that taken by Henriksen (1980). Lakes were stratified by ANC and then within each group the linear regression between pH and DOC was calculated. These regression lines form the nomograph on a plot of pH vs DOC. The diagram can then be used to predict the change in pH given a changes in ANC and DOC.

Before this nomograph can be applied to the Risdalsheia data two analytical differences must be dealt with. First the diagram is developed using dissolved organic carbon (DOC) whereas the data for Risdalsheia are total organic carbon (TOC). Because of the low amounts of particulate matter in runoff at Risdalsheia TOC should be approximately equal to DOC. Secondly the definition of ANC used by Munson et al. (1990) includes cationic aluminum (and also Fe and Mn, not measured at Risdalsheia) as a base cation. For the RAIN project the definition of alkalinity (ie. ANC) suggested by Reuss and Johnson (1986) is used and does not include Al as a base cation. The relative merits of these two definition is the subject of ongoing debate. To evaluate the suitability of the Munson et al. (1990) nomograph for the Risdalsheia data, Al was considered as a base cation and the alkalinity values adjusted accordingly.

When plotted on the nomograph the data from KIM catchment at Risdalsheia fit the expected trend but the observed H^+ concentrations are somewhat higher than

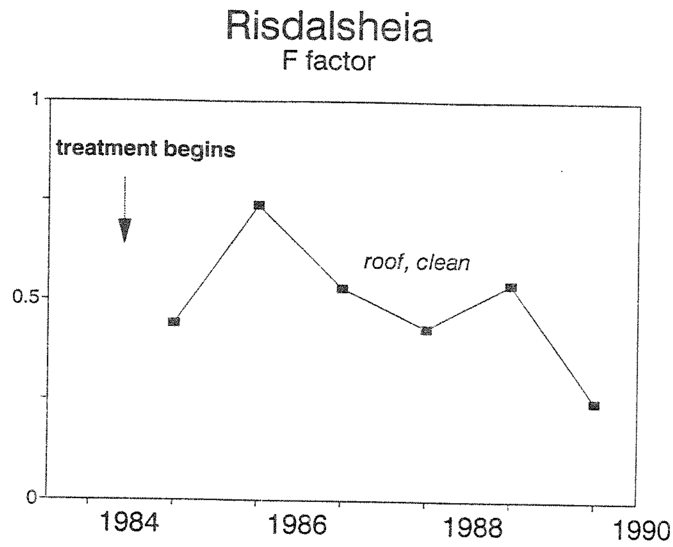

Figure 12. F-factor (delta $Ca^* + Mg^*$ / delta $SO_4^* + NO_3$) for volume-weighted concentrations in runoff at the roof clean rain catchment at Risdalsheia. The F-factor is calculated with respect to the pre-treatment year in all cases.

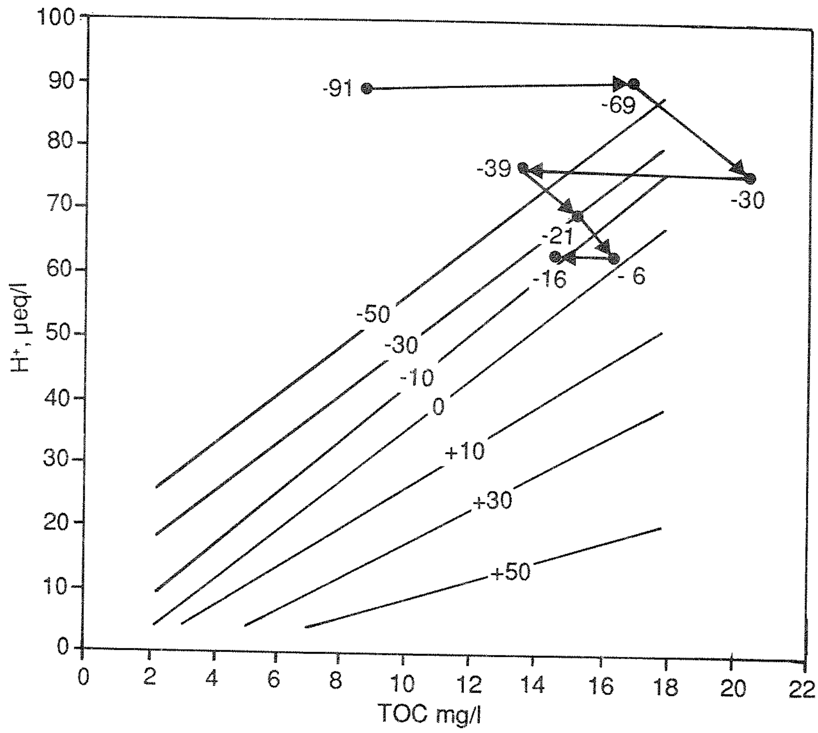

Figure 13. H^+ vs. TOC concentrations in volume-weighted mean runoff from KIM catchment (roof, clean rain) at Risdalsheia for the years 1983-1990. Values next to the points are alkalinity defined as sum of base cations (including NH_4 and Al^+) minus sum of strong acid anions. Also shown are the empirical isolines derived from data for 1400 lakes in the Adirondack Park of New York, USA (after Munson et al. 1990).

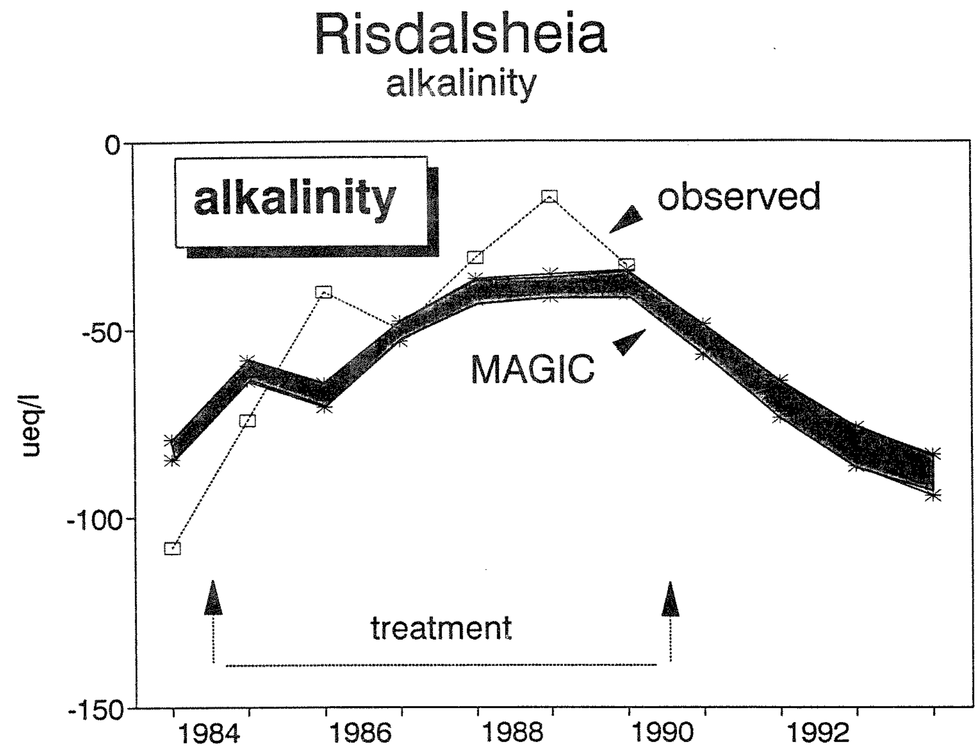

Figure 14. Alkalinity in runoff at KIM catchment (roof, clean rain) at Risdalsheia measured and predicted by MAGIC, a process-oriented acidification model. The bands in MAGIC predictions reflect uncertainty in parameters used by the model (modified from Wright et al. 1990).

predicted (Figure 13). The first point at TOC of 8 mg/l, H^+ of 90 μeq/l and ANC of -91 μeq/l represents only the short pre-treatment period in spring 1984 and not an entire year; TOC levels are much lower during snowmelt relative to the rest of the year. From the first year of treatment to the 6th year of treatment the TOC levels have remained relatively constant, but both H^+ and ANC have declined. The points lie somewhat higher on the graph than the empirical regression lines; apparently the organic acids at Risdalsheia have a somewhat higher strength (lower pK) than do the organic acids in the lakes of the Adirondacks.

The data from Risdalsheia have also been used to evaluate the MAGIC model (Wright et al. 1990). The application of MAGIC to the first 4-years of treatment data entailed first calibration of the model to the untreated ROLF catchment, and then simulation of the acid exclusion experiment at KIM catchment by changing deposition and predicting changes in runoff chemistry (Wright et al. 1990). Measured monthly values for deposition of major ions at KIM catchment were used to drive the model, thus taking into account the month-to-month fluctuations in water flux, snow accumulation and melt, and dry deposit. To evaluate the effects of uncertainty in the data and the model parameters the model was calibrated several times to produce ranges for the predicted chemistry.

The additional two years of treatment data generally follow the trends predicted by MAGIC (Figure 14). Here the actual monthly deposition data for 1988-90 have not been used to drive the model. Thus the predicted alkalinity bands for these years may differ somewhat from those shown on Figure 14.

4. Plans for the future at Sogndal and Risdalsheia

The RAIN project was originally planned for 5 years beginning in June 1993 with 1-year of background data and 4 years of treatment. The project was extended from 3 years to June 1991 at which time 7 years of treatment will have been completed. Although the RAIN project formally finishes in June 1991, activities will continue at both Sogndal and Risdalsheia.

At Risdalsheia the experiment will most probably continue for a further 3 years through

June 1994. The main objective of the continuation is to obtain further information regarding the role of organic acids in the reversibility of freshwater acidification.

At Sogndal treatment will continue at least through November 1991 to complete the eight year of acid addition. Here the major objective is to confirm the incipient "nitrogen saturation" observed in 1989-90 at both treated catchments. The fate of the Sogndal site after 1991 is uncertain. At least 1 complete year of data will be collected upon cessation of treatment.

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APPENDIX 1

Appendices

Appendix 1. Visitors to Risdalsheia 1988, 1989 and 1990

Visitors to Risdalsheia 1988

2 May	Vennesla High School
7 May	Scientists from International Workshop on Aluminum and Drinking Water
30 May	Folsæ Agricultural College
2 June	Students from University of Göttingen, FRG
7 June	Norwegian National Television
6 August	Nordic Ecological Society
15 Sept.	Community School
16 Sept.	UK Minister of Environment
26 Sept.	NIVA's Board of directors
27 Sept.	Scientists from Finnish National Board of Waters
27 Sept.	Moland forest owners association
30 Sept.	Biologists from UK and Norway
19 Oct.	Grimstad municipal environment committee
2 Nov.	Frivoll School
12 Nov.	Landvik forest owners association

Total of about 300 visitors registered in 1988.

Visitors to Risdalsheia 1989

8 March	Norwegian National Radio program "Nature"
5 April	newspaper "Aftenposten" Friday supplement "A-magazine"
12 April	Froland Junior High School
11 May	Grimstad boy scout troup
1 June	Birkeland Junior HIgh School
5 June	Høvåg Primary School
6 June	NTNF board of directors and administration
12 June	Kristiansand Junior HIgh School
23 July	M. Hauhs with students from University of Göttingen, FRG
4 August	Information group "Acid rain"
4 Sept.	Information group "Acid rain" with representatives from Bronosaurus, Czechoslovakia
7 Sept.	Ecology group, Community College, Kristiansand
13 Sept.	hydrologists from Norwegian Water Resources Board
22 Sept.	Hans Martin and Bill Harte, Environment Canada
10 Oct.	Richard North, National Rivers Authority, UK
7 Nov.	Grimstad Junior HIgh School
13 Nov.	newspaper VG
15 Nov.	newspaper "Nytt fra Norge"

Visitors to Risdalsheia 1990

10 Feb.	Group of high school teachers
21 March	Agder Community College (environment group)
23 April	Moland Junior High School
9 May	Grøm Rotary
10 May	Holt Agricultural College
16 May	Grimstad Junior High School
23 May	Øksnevad High School, Kleppe
26 May	fisherman S.E. Hanssen and family
29 May	E. Dambrine and J. Ranger, University Nancy, France
30 May	Advisory commission for national liming program
30 May	Norwegian National Radio nature program
6 June	National agricultural research stations
6 June	Velstrand Junior High School
14 June	Eg High School
28 June	Representatives from Norwegian Agricultural University
29 June	A. Bulger and J. Cosby, University of Virginia, USA; A. Kenskins, Institute of Hydrology, UK; I. Greve, Stirling University, UK
2 July	Politicians against acid rain (Agder and Telemark counties)
6 July	Kristiansand Teacher College (course in environmental studies)
9 August	Norwegian National Radio, foreign broadcasting
23 August	T. Dalziel, PowerGen (UK), P. Clarke, UK
1 Sept.	The Norwegian Forest Association
8 Sept.	A. Fenningsmoen
13 Sept.	Community School, Kristiansand, Ecology group
13 Sept.	Environmental technology class, Osebakken, Porsgrunn
26 Sept.	T. Paces, Czech Geological Survey
17 Oct.	Grimstad Junior High School
18 Oct.	Eik Teachers College, Tønsberg
25 Oct.	TEFA-TEFT groups (Agder and Telemark)
1 Nov.	Søgne Junior High School
6 Nov.	Barbu High School, Arendal

29 Nov.	High school teachers from Aust- and Vest-Agder counties
14 Nov.	Students from Agder Engineering and District College (AID)

Total of about 620 visitors registered in 1990.

APPENDIX 2

Appendix 2. Sogndal. Discharge

Year	Date	SOG1 MM	corrected SOG2 MM	SOG4 MM
1987	1116	0.32	0.28	0.24
1987	1117	0.47	0.41	0.35
1987	1118	0.47	0.41	0.35
1987	1119	0.47	0.41	0.35
1987	1120	0.47	0.41	0.35
1987	1121	0.47	0.41	0.35
1987	1122	0.47	0.41	0.35
1987	1123	0.47	0.41	0.35
1987	1124	0.47	0.41	0.35
1987	1125	0.32	0.28	0.24
1987	1126	0.32	0.28	0.24
1987	1127	0.32	0.28	0.24
1987	1128	0.32	0.28	0.24
1987	1129	0.32	0.28	0.24
1987	1130	0.18	0.16	0.13
1987	1201	0.18	0.16	0.13
1987	1202	0.18	0.16	0.13
1987	1203	0.18	0.16	0.13
1987	1204	0.18	0.16	0.13
1987	1205	0.18	0.16	0.13
1987	1206	0.18	0.16	0.13
1987	1207	0.18	0.16	0.13
1987	1208	0.18	0.16	0.13
1987	1209	0.18	0.16	0.13
1987	1210	0.18	0.16	0.13
1987	1211	0.18	0.16	0.13
1987	1212	0.18	0.16	0.13
1987	1213	0.18	0.16	0.13
1987	1214	0.18	0.16	0.13
1987	1215	0.18	0.16	0.13
1987	1216	0.18	0.16	0.13
1987	1217	0.18	0.16	0.13
1987	1218	0.18	0.16	0.13
1987	1219	0.18	0.16	0.13
1987	1220	0.18	0.16	0.13
1987	1221	0.18	0.16	0.13
1987	1222	0.18	0.16	0.13
1987	1223	0.18	0.16	0.13
1987	1224	0.18	0.16	0.13
1987	1225	0.18	0.16	0.13
1987	1226	0.18	0.16	0.13
1987	1227	0.32	0.28	0.24
1987	1228	0.47	0.41	0.35
1987	1229	0.47	0.41	0.35
1987	1230	0.47	0.41	0.35
1987	1231	0.96	0.84	0.71
1988	101	0.96	0.84	0.71
1988	102	0.96	0.84	0.71
1988	103	0.72	0.63	0.53
1988	104	0.72	0.63	0.53
1988	105	0.47	0.41	0.35
1988	106	0.47	0.41	0.35
1988	107	0.47	0.41	0.35
1988	108	0.47	0.41	0.35
1988	109	0.47	0.41	0.35
1988	110	0.47	0.41	0.35
1988	111	0.47	0.41	0.35

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Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	112	0.47	0.41	0.35
1988	113	0.47	0.41	0.35
1988	114	0.18	0.16	0.13
1988	115	0.18	0.16	0.13
1988	116	0.18	0.16	0.13
1988	117	0.18	0.16	0.13
1988	118	0.18	0.16	0.13
1988	119	0.18	0.16	0.13
1988	120	0.18	0.16	0.13
1988	121	0.18	0.16	0.13
1988	122	0.18	0.16	0.13
1988	123	0.18	0.16	0.13
1988	124	0.18	0.16	0.13
1988	125	0.18	0.16	0.13
1988	126	0.18	0.16	0.13
1988	127	0.18	0.16	0.13
1988	128	0.18	0.16	0.13
1988	129	0.18	0.16	0.13
1988	130	0.18	0.16	0.13
1988	131	0.18	0.16	0.13
1988	201	0.18	0.16	0.13
1988	202	0.18	0.16	0.13
1988	203	0.18	0.16	0.13
1988	204	0.18	0.16	0.13
1988	205	0.18	0.16	0.13
1988	206	0.18	0.16	0.13
1988	207	0.18	0.16	0.13
1988	208	0.18	0.16	0.13
1988	209	0.18	0.16	0.13
1988	210	0.18	0.16	0.13
1988	211	0.18	0.16	0.13
1988	212	0.18	0.16	0.13
1988	213	0.18	0.16	0.13
1988	214	0.18	0.16	0.13
1988	215	0.18	0.16	0.13
1988	216	0.18	0.16	0.13
1988	217	0.18	0.16	0.13
1988	218	0.18	0.16	0.13
1988	219	0.18	0.16	0.13
1988	220	0.18	0.16	0.13
1988	221	0.18	0.16	0.13
1988	222	0.18	0.16	0.13
1988	223	0.18	0.16	0.13
1988	224	0.18	0.16	0.13
1988	225	0.18	0.16	0.13
1988	226	0.18	0.16	0.13
1988	227	0.18	0.16	0.13
1988	228	0.18	0.16	0.13
1988	229	0.18	0.16	0.13
1988	301	0.18	0.16	0.13
1988	302	0.18	0.16	0.13
1988	303	0.18	0.16	0.13
1988	304	0.18	0.16	0.13
1988	305	0.18	0.16	0.13
1988	306	0.18	0.16	0.13
1988	307	0.18	0.16	0.13
1988	308	0.18	0.16	0.13
1988	309	0.18	0.16	0.13
1988	310	0.18	0.16	0.13
1988	311	0.18	0.16	0.13

file: sogv-kor.wk1 13/6/89

Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	312	0.18	0.16	0.13
1988	313	0.18	0.16	0.13
1988	314	0.18	0.16	0.13
1988	315	0.18	0.16	0.13
1988	316	0.18	0.16	0.13
1988	317	0.18	0.16	0.13
1988	318	0.18	0.16	0.13
1988	319	0.18	0.16	0.13
1988	320	0.18	0.16	0.13
1988	321	0.18	0.16	0.13
1988	322	0.18	0.16	0.13
1988	323	0.18	0.16	0.13
1988	324	0.18	0.16	0.13
1988	325	0.18	0.16	0.13
1988	326	0.18	0.16	0.13
1988	327	0.18	0.16	0.13
1988	328	0.18	0.16	0.13
1988	329	0.18	0.16	0.13
1988	330	0.18	0.16	0.13
1988	331	0.18	0.16	0.13
1988	401	0.18	0.16	0.13
1988	402	0.18	0.16	0.13
1988	403	0.18	0.16	0.13
1988	404	0.18	0.16	0.13
1988	405	0.18	0.16	0.13
1988	406	0.18	0.16	0.13
1988	407	0.18	0.16	0.13
1988	408	0.18	0.16	0.13
1988	409	0.18	0.16	0.13
1988	410	0.18	0.16	0.13
1988	411	0.18	0.16	0.13
1988	412	0.18	0.16	0.13
1988	413	0.18	0.16	0.13
1988	414	0.18	0.16	0.13
1988	415	0.18	0.16	0.13
1988	416	0.18	0.16	0.13
1988	417	0.47	0.41	0.35
1988	418	2.60	2.27	1.93
1988	419	2.60	2.27	1.93
1988	420	1.65	1.45	1.22
1988	421	1.65	1.45	1.22
1988	422	1.32	1.15	0.98
1988	423	0.96	0.84	0.71
1988	424	0.96	0.84	0.71
1988	425	0.72	0.63	0.53
1988	426	0.47	0.41	0.35
1988	427	0.47	0.41	0.35
1988	428	0.47	0.41	0.35
1988	429	0.47	0.41	0.35
1988	430	0.47	0.41	0.35
1988	501	0.47	0.41	0.35
1988	502	0.47	0.41	0.35
1988	503	3.20	2.80	2.37
1988	504	8.09	7.08	6.00
1988	505	13.01	11.39	9.64
1988	506	14.41	12.61	10.68
1988	507	17.58	15.39	13.03
1988	508	21.13	18.49	15.66
1988	509	34.20	29.93	25.35
1988	510	14.41	12.61	10.68

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Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	511	13.01	11.39	9.64
1988	512	23.10	20.22	17.12
1988	513	19.36	16.94	14.35
1988	514	17.58	15.39	13.03
1988	515	17.58	15.39	13.03
1988	516	17.58	15.39	13.03
1988	517	11.62	10.17	8.61
1988	518	5.28	4.62	3.91
1988	519	4.54	3.97	3.36
1988	520	3.20	2.80	2.37
1988	521	2.60	2.27	1.93
1988	522	3.79	3.32	2.81
1988	523	5.28	4.62	3.91
1988	524	7.07	6.19	5.24
1988	525	9.18	8.04	6.80
1988	526	14.41	12.61	10.68
1988	527	16.00	14.01	11.86
1988	528	13.01	11.39	9.64
1988	529	10.40	9.10	7.71
1988	530	8.13	7.11	6.02
1988	531	5.28	4.62	3.91
1988	601	3.79	3.32	2.81
1988	602	2.60	2.27	1.93
1988	603	2.13	1.86	1.58
1988	604	1.65	1.45	1.22
1988	605	1.65	1.45	1.22
1988	606	1.32	1.15	0.98
1988	607	0.96	0.84	0.71
1988	608	0.96	0.84	0.71
1988	609	0.96	0.84	0.71
1988	610	0.96	0.84	0.71
1988	611	0.72	0.63	0.53
1988	612	0.72	0.63	0.53
	SUM	426.3	373.1	315.9
1988	613	0.35	0.35	0.35
1988	614	0.24	0.24	0.24
1988	615	0.08	0.08	0.08
1988	616	0.02	1.80	0.02
1988	617	0.00	1.80	0.00
1988	618	0.00	1.08	0.00
1988	619	0.00	1.08	0.00
1988	620	0.00	1.08	0.00
1988	621	0.00	0.36	0.00
1988	622	0.00	0.00	0.00
1988	623	0.00	0.00	0.00
1988	624	0.00	0.00	0.00
1988	625	0.00	0.00	0.00
1988	626	0.00	0.00	0.00
1988	627	0.00	0.00	0.00
1988	628	0.00	0.00	0.22
1988	629	0.00	0.00	1.34
1988	630	0.00	0.00	16.02
1988	701	0.00	0.00	4.01
1988	702	0.00	0.00	4.01
1988	703	0.00	0.00	0.00
1988	704	0.00	0.00	0.00
1988	705	0.00	0.00	0.00
1988	706	0.02	0.02	0.02
1988	707	0.02	0.02	0.02

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Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	708	0.02	0.02	0.02
1988	709	0.03	0.03	0.03
1988	710	0.08	0.08	0.08
1988	711	0.08	0.08	0.08
1988	712	0.14	0.14	0.14
1988	713	0.14	0.14	0.14
1988	714	0.14	0.14	0.14
1988	715	0.14	0.14	0.14
1988	716	0.14	0.14	0.14
1988	717	0.24	0.24	0.24
1988	718	0.35	0.35	0.35
1988	719	0.35	0.35	0.35
1988	720	1.24	1.24	1.24
1988	721	3.97	3.97	3.97
1988	722	1.95	1.95	1.95
1988	723	0.99	0.99	0.99
1988	724	0.99	0.99	0.99
1988	725	1.95	1.95	1.95
1988	726	1.24	1.24	1.24
1988	727	1.24	1.24	1.24
1988	728	1.24	1.24	1.24
1988	729	0.99	0.99	0.99
1988	730	0.72	0.72	0.72
1988	731	3.97	3.97	3.97
1988	801	1.95	1.95	1.95
1988	802	1.24	1.24	1.24
1988	803	0.99	0.99	0.99
1988	804	0.99	0.99	0.99
1988	805	1.24	1.24	1.24
1988	806	0.99	0.99	0.99
1988	807	2.85	2.85	2.85
1988	808	1.60	1.60	1.60
1988	809	0.99	0.99	0.99
1988	810	0.72	0.72	0.72
1988	811	0.72	0.72	0.72
1988	812	0.72	4.72	4.72
1988	813	0.54	8.54	8.54
1988	814	0.35	2.35	2.35
1988	815	0.72	0.72	0.72
1988	816	2.85	2.85	2.85
1988	817	1.95	1.95	1.95
1988	818	1.24	1.24	1.24
1988	819	1.95	1.95	1.95
1988	820	2.85	2.85	2.85
1988	821	2.40	2.40	2.40
1988	822	2.85	2.85	2.85
1988	823	1.60	1.60	1.60
1988	824	1.24	1.24	1.24
1988	825	0.99	0.99	0.99
1988	826	0.72	0.72	0.72
1988	827	0.72	0.72	0.72
1988	828	0.54	0.54	0.54
1988	829	0.72	0.72	0.72
1988	830	0.72	0.72	0.72
1988	831	0.72	0.72	0.72
1988	901	0.72	0.72	0.72
1988	902	0.35	0.35	0.35
1988	903	0.35	0.35	0.35
1988	904	0.35	0.35	0.35
1988	905	0.35	0.35	0.35

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Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	906	0.35	0.35	0.35
1988	907	0.35	0.35	0.35
1988	908	0.35	0.35	0.35
1988	909	0.35	0.35	0.35
1988	910	0.24	0.24	0.24
1988	911	0.24	0.24	0.24
1988	912	0.24	0.24	0.24
1988	913	0.24	0.24	0.24
1988	914	0.24	0.24	0.24
1988	915	0.24	0.24	0.24
1988	916	0.24	0.24	0.24
1988	917	0.24	0.24	0.24
1988	918	0.14	0.14	0.14
1988	919	1.43	1.43	1.43
1988	920	26.31	26.31	26.31
1988	921	19.47	19.47	19.47
1988	922	6.79	6.79	6.79
1988	923	4.78	4.78	4.78
1988	924	10.58	10.58	10.58
1988	925	7.90	7.90	7.90
1988	926	6.79	6.79	6.79
1988	927	10.58	10.58	10.58
1988	928	19.47	19.47	19.47
1988	929	7.90	7.90	7.90
1988	930	6.79	6.79	6.79
1988	1001	4.78	4.78	4.78
1988	1002	2.47	2.47	2.47
1988	1003	3.19	7.19	7.19
1988	1004	2.47	10.47	10.47
1988	1005	2.47	4.47	4.47
1988	1006	3.19	3.19	3.19
1988	1007	3.19	3.19	3.19
1988	1008	1.97	1.97	1.97
1988	1009	1.97	1.97	1.97
1988	1010	2.47	2.47	2.47
1988	1011	1.97	1.97	1.97
1988	1012	1.43	1.43	1.43
1988	1013	1.43	1.43	1.43
1988	1014	1.43	1.43	1.43
1988	1015	1.43	1.43	1.43
1988	1016	1.43	1.43	1.43
1988	1017	1.43	1.43	1.43
1988	1018	1.07	1.07	1.07
1988	1019	0.70	0.70	0.70
1988	1020	0.70	0.70	0.70
1988	1021	0.70	0.70	0.70
1988	1022	0.70	0.70	0.70
1988	1023	0.70	0.70	0.70
1988	1024	0.70	0.70	0.70
1988	1025	0.70	0.70	0.70
1988	1026	0.70	0.70	0.70
1988	1027	1.07	1.07	1.07
1988	1028	2.47	2.47	2.47
1988	1029	1.97	1.97	1.97
1988	1030	1.43	1.43	1.43
1988	1031	1.43	1.43	1.43
1988	1101	1.43	1.43	1.43
1988	1102	1.07	1.07	1.07
1988	1103	0.70	0.70	0.70
1988	1104	0.70	0.70	0.70

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Year	Date	SOG1 MM	SOG2 MM	SOG4 MM
1988	1105	0.70	0.70	0.70
1988	1106	0.70	0.70	0.70
1988	1107	0.70	0.70	0.70
1988	1108	0.70	0.70	0.70
1988	1109	0.70	0.70	0.70
1988	1110	0.70	0.70	0.70
1988	1111	3.19	3.19	3.19
1988	1112	4.78	4.78	4.78
1988	1113	3.89	3.89	3.89
1988	1114	2.47	2.47	2.47
1988	1115	3.19	3.19	3.19
1988	1116	5.68	5.68	5.68
1988	1117	10.58	10.58	10.58
1988	1118	5.68	5.68	5.68
1988	1119	3.19	3.19	3.19
1988	1120	2.47	2.47	2.47
1988	1121	1.43	1.43	1.43
1988	1122	1.43	1.43	1.43
1988	1123	1.43	1.43	1.43
1988	1124	3.89	3.89	3.89
1988	1125	19.47	19.47	19.47
1988	1126	5.68	5.68	5.68
1988	1127	2.47	2.47	2.47
	SUM	341.0	376.1	394.5

Sogndal discharge corrected

Year	Date	SOG1	SOG2	SOG4
		mm	mm	mm
1988	1128	1.24	4.69	2.15
1988	1129	0.71	4.69	1.06
1988	1130	0.71	4.69	1.06
		2.67	14.08	4.28
1988	1201	0.51	4.69	1.06
1988	1202	0.51	3.00	1.06
1988	1203	0.35	3.00	1.06
1988	1204	0.35	3.00	1.06
1988	1205	0.35	3.00	1.06
1988	1206	0.35	3.00	2.15
1988	1207	0.35	3.00	2.15
1988	1208	0.35	3.00	2.15
1988	1209	0.51	4.69	0.40
1988	1210	0.51	4.69	0.00
1988	1211	0.35	3.00	0.00
1988	1212	0.35	3.00	0.00
1988	1213	0.35	1.73	0.00
1988	1214	0.35	1.73	0.00
1988	1215	1.57	1.73	0.00
1988	1216	1.94	1.73	0.00
1988	1217	1.94	1.73	0.00
1988	1218	6.88	1.73	0.00
1988	1219	8.71	1.73	0.00
1988	1220	7.76	1.73	0.00
1988	1221	1.24	1.73	0.00
1988	1222	1.24	1.73	0.00
1988	1223	1.24	1.73	0.00
1988	1224	1.24	1.73	0.00
1988	1225	1.24	1.73	0.00
1988	1226	1.57	1.73	0.00
1988	1227	1.94	1.73	0.00
1988	1228	1.94	1.73	0.00
1988	1229	6.88	1.73	0.00
1988	1230	8.71	1.73	0.00
1988	1231	7.76	1.73	0.00
		69.36	74.03	12.17
1989	101	6.06	1.73	0.07
1989	102	7.76	4.69	2.15
1989	103	9.72	4.69	1.06
1989	104	6.88	3.00	0.40
1989	105	6.06	1.73	0.07
1989	106	4.60	1.73	0.07
1989	107	3.37	0.86	0.07
1989	108	1.94	0.86	0.07
1989	109	1.24	0.86	0.07
1989	110	1.24	0.86	0.07
1989	111	1.24	0.86	0.07
1989	112	1.24	0.86	0.00
1989	113	1.24	0.86	0.00
1989	114	1.24	0.32	0.00
1989	115	1.24	0.32	0.00
1989	116	0.71	0.32	0.00
1989	117	0.71	0.32	0.07
1989	118	0.96	0.86	0.07
1989	119	1.57	1.73	0.40

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	120	3.96	6.86	5.82
1989	121	2.84	3.00	2.15
1989	122	1.94	1.73	1.06
1989	123	1.57	1.73	1.06
1989	124	0.96	1.73	0.40
1989	125	0.96	1.73	1.06
1989	126	0.96	1.73	1.06
1989	127	0.71	1.73	1.06
1989	128	1.24	1.73	2.15
1989	129	1.57	1.73	3.72
1989	130	1.94	1.73	3.72
1989	131	1.94	1.73	2.15
		79.58	54.67	30.17
1989	201	1.94	1.73	3.72
1989	202	1.57	0.86	2.15
1989	203	0.96	0.86	1.06
1989	204	0.96	0.86	1.06
1989	205	0.96	0.86	1.06
1989	206	1.24	1.73	2.15
1989	207	1.94	3.00	3.72
1989	208	1.24	0.86	2.15
1989	209	0.96	0.86	1.06
1989	210	0.96	0.32	0.40
1989	211	0.35	0.32	0.40
1989	212	0.35	0.32	0.40
1989	213	0.35	0.32	0.40
1989	214	0.35	0.06	0.40
1989	215	0.35	0.06	0.40
1989	216	0.35	0.06	0.40
1989	217	0.35	0.06	0.40
1989	218	0.35	0.06	0.07
1989	219	0.35	0.06	0.07
1989	220	0.35	0.06	0.07
1989	221	0.35	0.06	0.07
1989	222	0.35	0.06	0.07
1989	223	0.35	0.06	0.07
1989	224	0.35	0.06	0.07
1989	225	0.35	0.06	0.07
1989	226	0.35	0.06	0.07
1989	227	0.35	0.06	0.07
1989	228	0.35	0.06	0.07
		19.04	13.78	22.12
1989	301	0.35	0.06	0.07
1989	302	0.35	0.06	0.07
1989	303	0.35	0.06	0.07
1989	304	0.35	0.06	0.07
1989	305	0.13	0.06	0.07
1989	306	0.13	0.06	0.07
1989	307	0.71	0.06	0.07
1989	308	1.24	0.06	1.06
1989	309	1.24	0.06	2.15
1989	310	1.24	0.06	1.06
1989	311	1.24	0.06	1.06
1989	312	1.24	0.06	1.06
1989	313	1.24	0.06	1.06
1989	314	1.24	0.06	1.06
1989	315	0.35	0.32	0.40
1989	316	0.35	0.32	0.40

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	317	0.35	0.32	0.40
1989	318	0.35	0.32	0.07
1989	319	0.35	0.32	0.07
1989	320	0.35	0.32	0.07
1989	321	0.35	0.32	0.07
1989	322	0.35	0.32	0.07
1989	323	0.35	0.32	0.07
1989	324	0.35	0.32	0.07
1989	325	0.35	0.32	0.07
1989	326	0.35	0.32	0.07
1989	327	0.35	0.32	0.07
1989	328	0.35	0.32	0.07
1989	329	0.71	0.32	2.15
1989	330	0.71	0.32	1.06
1989	331	0.71	0.32	0.40
		18.12	6.26	14.66
1989	401	1.24	0.32	0.40
1989	402	1.24	0.32	1.06
1989	403	0.96	0.32	1.06
1989	404	0.96	0.32	0.40
1989	405	0.96	0.32	0.40
1989	406	0.96	0.32	0.40
1989	407	0.96	0.32	0.40
1989	408	0.96	0.32	0.07
1989	409	0.96	0.32	0.07
1989	410	0.71	0.32	0.07
1989	411	0.71	0.32	0.40
1989	412	1.57	0.86	1.06
1989	413	3.96	3.00	2.15
1989	414	18.78	6.86	5.82
1989	415	43.30	25.92	25.92
1989	416	48.61	25.92	32.14
1989	417	29.53	16.52	15.80
1989	418	22.05	12.74	11.82
1989	419	18.78	12.74	8.50
1989	420	18.78	12.74	5.82
1989	421	15.83	9.53	3.72
1989	422	13.17	9.53	3.72
1989	423	13.17	4.69	8.50
1989	424	11.95	4.69	11.82
1989	425	10.80	4.69	5.82
1989	426	9.72	3.00	5.82
1989	427	8.71	3.00	15.80
1989	428	8.71	3.00	3.72
1989	429	7.76	1.73	3.72
1989	430	6.88	1.73	5.82
		322.66	166.41	182.21
1989	501	2.84	1.73	5.82
1989	502	8.71	9.53	25.92
1989	503	23.80	25.92	32.14
1989	504	15.83	20.90	15.80
1989	505	9.72	9.53	11.82
1989	506	6.88	6.86	5.82
1989	507	6.88	4.69	5.82
1989	508	6.88	4.69	8.50
1989	509	6.88	6.86	8.50
1989	510	6.88	12.74	5.82
1989	511	6.88	9.53	5.82

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	512	7.76	9.53	5.82
1989	513	7.76	6.86	5.82
1989	514	7.76	9.53	15.80
1989	515	17.27	16.52	20.49
1989	516	29.53	31.58	25.92
1989	517	14.46	16.52	11.82
1989	518	13.17	12.74	11.82
1989	519	22.05	20.90	25.92
1989	520	15.83	16.52	20.49
1989	521	18.78	12.74	15.80
1989	522	17.27	16.52	20.49
1989	523	20.38	20.90	20.49
1989	524	18.78	20.90	15.80
1989	525	25.63	25.92	25.92
1989	526	13.17	12.74	11.82
1989	527	10.80	9.53	11.82
1989	528	10.80	9.53	11.82
1989	529	6.88	4.69	8.50
1989	530	4.60	3.00	5.82
1989	531	5.30	3.00	5.82
		390.12	393.19	429.76
1989	601	6.88	3.00	5.82
1989	602	6.88	3.00	5.82
1989	603	7.76	3.00	8.50
1989	604	10.80	6.86	11.82
1989	605	10.80	9.53	11.82
1989	606	13.17	9.53	15.80
1989	607	15.83	16.52	15.80
1989	608	18.78	16.52	15.80
1989	609	15.83	12.74	15.80
1989	610	15.83	12.74	11.82
1989	611	13.17	9.53	11.82
1989	612	13.17	9.53	11.82
1989	613	15.83	9.53	11.82
1989	614	29.53	12.74	11.82
1989	615	18.78	9.53	8.50
1989	616	17.27	6.86	8.50
1989	617	10.80	6.86	3.72
1989	618	18.78	6.86	3.72
1989	619	18.78	6.86	2.15
1989	620	13.17	4.69	1.06
1989	621	13.17	3.00	0.40
1989	622	14.46	0.86	0.40
1989	623	14.46	0.86	0.07
1989	624	14.46	0.32	0.07
1989	625	17.27	0.32	0.07
1989	626	17.27	0.86	2.15
1989	627	8.71	0.86	2.15
1989	628	6.06	0.86	1.06
1989	629	4.60	0.86	3.72
1989	630	3.96	0.86	5.82
		406.28	186.07	209.63
1989	701	5.30	4.69	3.72
1989	702	6.88	4.69	2.15
1989	703	5.30	3.00	2.15
1989	704	5.30	3.00	1.06
1989	705	4.60	1.73	1.06
1989	706	3.96	1.73	0.40

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	707	3.96	0.86	0.40
1989	708	3.96	0.86	0.40
1989	709	3.96	0.32	0.07
1989	710	3.37	0.06	0.07
1989	711	3.37	0.00	0.07
1989	712	2.84	0.00	0.40
1989	713	2.37	0.06	0.40
1989	714	2.37	0.32	0.40
1989	715	2.37	0.32	3.72
1989	716	2.37	6.86	3.72
1989	717	2.37	4.69	3.72
1989	718	2.37	4.69	2.15
1989	719	1.94	1.73	2.15
1989	720	1.94	1.73	2.15
1989	721	1.94	0.86	2.15
1989	722	2.37	0.86	1.06
1989	723	2.37	0.32	1.06
1989	724	1.94	0.32	1.06
1989	725	1.94	0.06	0.40
1989	726	1.57	0.06	0.40
1989	727	1.24	0.00	0.40
1989	728	1.24	0.00	0.40
1989	729	1.24	0.32	0.40
1989	730	1.24	0.86	2.15
1989	731	1.24	0.86	2.15
		89.20	45.87	41.97
sum winter 89		1368	930	921
1989	801	2.84	0.86	0.40
1989	802	2.84	0.86	0.07
1989	803	2.84	0.86	0.07
1989	804	2.84	0.86	0.07
1989	805	2.84	0.86	0.40
1989	806	2.84	0.86	0.07
1989	807	2.84	0.86	0.07
1989	808	0.96	0.86	0.07
1989	809	0.96	0.86	0.07
1989	810	0.96	0.86	2.15
1989	811	0.96	0.86	2.15
1989	812	0.96	1.73	2.15
1989	813	0.96	3.00	2.15
1989	814	1.24	1.73	3.72
1989	815	1.24	1.73	3.72
1989	816	1.24	3.00	3.72
1989	817	1.57	3.00	5.82
1989	818	2.84	3.00	8.50
1989	819	6.88	4.69	11.82
1989	820	11.95	9.53	20.49
1989	821	15.83	16.52	5.82
1989	822	5.30	9.53	5.82
1989	823	5.30	16.52	11.82
1989	824	5.30	12.74	20.49
1989	825	4.60	4.69	5.82
1989	826	3.37	3.00	3.72
1989	827	2.84	3.00	2.15
1989	828	2.84	1.73	2.15
1989	829	2.37	1.73	1.06
1989	830	1.94	1.73	1.06
1989	831	1.57	1.73	0.40

Year	Date	SOG1 mm 103.85	SOG2 mm 113.80	SOG4 mm 128.00
1989	901	1.24	1.73	1.06
1989	902	1.24	1.73	1.06
1989	903	1.24	1.73	1.06
1989	904	1.24	1.73	0.40
1989	905	1.24	1.73	0.40
1989	906	1.24	3.00	0.40
1989	907	0.71	3.00	0.40
1989	908	0.71	1.73	1.06
1989	909	0.71	1.73	2.15
1989	910	0.71	1.73	1.06
1989	911	0.71	1.73	0.40
1989	912	0.71	0.86	5.82
1989	913	0.71	0.86	2.15
1989	914	0.71	0.86	0.40
1989	915	0.71	4.69	0.40
1989	916	1.57	9.53	0.40
1989	917	1.94	4.69	3.72
1989	918	2.37	4.69	3.72
1989	919	3.37	3.00	8.50
1989	920	4.60	4.69	2.15
1989	921	7.76	9.53	2.15
1989	922	3.96	6.86	8.50
1989	923	4.60	4.69	3.72
1989	924	5.30	6.86	3.72
1989	925	2.84	3.00	3.72
1989	926	3.37	4.69	2.15
1989	927	2.37	3.00	2.15
1989	928	1.94	3.00	3.72
1989	929	1.57	12.74	5.82
1989	930	1.57	6.86	3.72
		62.98	116.72	76.07
1989	1001	1.57	6.86	3.72
1989	1002	1.57	4.69	2.15
1989	1003	1.57	3.00	2.15
1989	1004	1.57	3.00	2.15
1989	1005	1.57	1.73	1.06
1989	1006	1.57	1.73	2.15
1989	1007	1.57	1.73	1.06
1989	1008	1.57	1.73	1.06
1989	1009	1.57	1.73	1.06
1989	1010	1.94	1.73	1.06
1989	1011	1.94	1.73	1.06
1989	1012	1.94	1.73	1.06
1989	1013	2.37	1.73	1.06
1989	1014	2.37	1.73	1.06
1989	1015	2.84	1.73	1.06
1989	1016	2.84	1.73	1.06
1989	1017	3.37	1.73	1.06
1989	1018	3.96	3.00	3.72
1989	1019	4.60	4.69	5.82
1989	1020	5.30	4.69	5.82
1989	1021	6.06	4.69	3.72
1989	1022	6.06	6.86	5.82
1989	1023	8.71	9.53	11.82
1989	1024	8.71	6.86	8.50
1989	1025	8.71	6.86	5.82
1989	1026	6.88	6.86	5.82

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	1027	5.30	4.69	5.82
1989	1028	5.30	3.00	3.72
1989	1029	3.96	3.00	5.82
1989	1030	2.84	3.00	5.82
1989	1031	1.94	3.00	5.82
		112.02	110.83	108.94
1989	1101	1.57	3.00	5.82
sum summer 89 11/7-1/1		323.1	369.3	340.7
sum year 88-89		1677.5	1298.7	1257.2

Sogndal discharge

Year	Date	SOG1 mm	SOG2 mm	1989-90 SOG4 mm
1989	1101	1.94	1.73	1.06
1989	1102	1.94	1.73	1.06
1989	1103	2.84	3.00	3.72
1989	1104	3.96	4.69	3.72
1989	1105	4.60	3.00	2.15
1989	1106	3.96	3.00	1.06
1989	1107	3.37	1.73	1.06
1989	1108	2.84	1.73	0.40
1989	1109	2.37	0.86	0.40
1989	1110	1.94	1.73	0.40
1989	1111	2.37	4.69	3.72
1989	1112	6.88	4.69	3.72
1989	1113	4.60	3.00	3.72
1989	1114	3.96	4.69	3.72
1989	1115	3.96	3.00	3.72
1989	1116	2.84	1.73	2.15
1989	1117	2.37	3.00	1.06
1989	1118	1.94	1.73	0.40
1989	1119	1.94	1.73	0.07
1989	1120	1.94	1.73	0.40
1989	1121	1.94	1.73	2.15
1989	1122	1.94	1.73	5.82
1989	1123	1.57	1.73	15.80
1989	1124	1.57	3.00	8.50
1989	1125	1.24	1.73	2.15
1989	1126	1.24	1.73	0.40
1989	1127	1.24	1.73	0.40
1989	1128	1.24	1.73	0.07
1989	1129	1.24	1.73	0.00
1989	1130	1.24	1.73	0.00
		75.08	70.11	71.93
1989	1201	1.24	0.00	0.00
1989	1202	0.96	0.00	0.00
1989	1203	0.96	0.06	0.00
1989	1204	0.96	0.32	0.00
1989	1205	0.96	0.32	0.07
1989	1206	0.96	0.86	0.07
1989	1207	0.96	0.86	0.40
1989	1208	0.96	0.86	0.40
1989	1209	0.96	0.86	0.40
1989	1210	0.71	0.86	0.40
1989	1211	0.71	0.86	0.40
1989	1212	0.71	0.86	0.40
1989	1213	0.51	0.86	0.40
1989	1214	0.51	0.86	0.40
1989	1215	0.51	0.32	0.40
1989	1216	0.51	0.32	0.40
1989	1217	0.51	0.32	0.40
1989	1218	0.51	0.32	0.40
1989	1219	0.51	0.32	0.40
1989	1220	0.51	0.32	0.40
1989	1221	0.51	0.32	0.40
1989	1222	0.51	0.32	0.40
1989	1223	0.51	0.32	0.40
1989	1224	0.51	0.32	0.40
1989	1225	0.51	0.32	2.15

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1989	1226	0.51	0.06	3.72
1989	1227	0.51	0.32	2.15
1989	1228	0.51	0.32	1.06
1989	1229	0.51	0.32	1.06
1989	1230	0.51	0.32	0.40
1989	1231	0.51	0.32	0.40
		20.79	13.58	18.21
1990	101	0.35	0.86	0.40
1990	102	0.35	0.86	0.40
1990	103	0.35	0.86	0.40
1990	104	0.35	0.86	0.40
1990	105	0.35	0.86	0.40
1990	106	0.35	0.86	0.40
1990	107	0.35	0.86	0.40
1990	108	0.35	0.86	0.40
1990	109	0.51	0.86	0.40
1990	110	0.51	0.86	0.40
1990	111	0.51	0.86	0.40
1990	112	0.51	0.86	0.40
1990	113	0.51	0.86	2.15
1990	114	0.51	0.86	3.72
1990	115	0.51	0.86	3.72
1990	116	0.51	0.86	2.15
1990	117	1.24	0.86	0.40
1990	118	1.24	0.86	0.07
1990	119	1.24	0.86	0.07
1990	120	1.24	0.86	0.07
1990	121	1.24	0.86	0.40
1990	122	1.24	0.86	0.40
1990	123	1.24	0.86	1.06
1990	124	1.24	0.86	1.06
1990	125	1.24	0.86	1.06
1990	126	1.24	0.86	0.40
1990	127	0.96	0.86	0.40
1990	128	0.96	0.86	0.40
1990	129	0.96	0.86	0.40
1990	130	0.96	0.86	0.40
1990	131	0.96	0.86	0.40
		24.09	26.59	23.46
1990	201	0.96	0.32	0.40
1990	202	0.96	0.32	0.40
1990	203	0.96	0.32	0.40
1990	204	0.96	0.32	0.40
1990	205	0.96	6.86	2.15
1990	206	2.37	20.90	15.80
1990	207	6.06	25.92	15.80
1990	208	6.06	1.73	8.50
1990	209	4.60	1.73	5.82
1990	210	3.37	1.73	3.72
1990	211	2.84	0.86	3.72
1990	212	2.84	0.86	2.15
1990	213	2.37	0.86	2.15
1990	214	1.94	0.32	0.40
1990	215	1.94	0.32	0.07
1990	216	1.94	0.32	0.07
1990	217	1.94	0.32	0.07
1990	218	1.94	0.32	0.07
1990	219	1.94	0.32	0.07

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1990	220	1.94	0.06	0.07
1990	221	1.94	0.32	0.07
1990	222	1.94	0.06	0.07
1990	223	1.94	0.86	0.40
1990	224	2.37	1.73	1.06
1990	225	2.37	0.86	1.06
1990	226	2.37	0.32	0.40
1990	227	2.37	0.32	0.40
1990	228	2.37	0.06	0.07
		66.55	69.23	65.77
1990	301	1.94	0.06	0.07
1990	302	1.94	0.06	0.07
1990	303	1.94	0.06	0.07
1990	304	1.94	0.06	0.07
1990	305	1.94	0.06	0.07
1990	306	1.94	0.06	0.07
1990	307	1.94	0.06	0.07
1990	308	1.24	0.06	0.07
1990	309	1.24	0.06	0.07
1990	310	1.24	0.06	0.07
1990	311	1.24	0.06	0.07
1990	312	1.24	0.06	0.07
1990	313	1.24	0.06	0.07
1990	314	1.24	0.06	0.07
1990	315	1.24	0.06	0.07
1990	316	1.94	0.86	0.40
1990	317	6.88	9.53	11.82
1990	318	14.46	16.52	8.50
1990	319	25.63	16.52	11.82
1990	320	20.38	3.00	3.72
1990	321	11.95	1.73	2.15
1990	322	9.72	1.73	1.06
1990	323	6.88	1.73	0.40
1990	324	6.88	1.73	0.40
1990	325	6.06	0.86	0.40
1990	326	4.60	0.86	0.40
1990	327	3.96	0.86	0.40
1990	328	3.37	0.86	0.40
1990	329	2.37	0.86	0.40
1990	330	1.57	0.32	0.40
1990	331	1.24	4.69	1.06
		151.38	63.56	44.80
1990	401	1.24	20.90	5.82
1990	402	1.24	4.69	2.15
1990	403	1.24	1.73	1.06
1990	404	1.24	0.32	0.40
1990	405	1.24	0.32	0.40
1990	406	1.24	0.32	0.40
1990	407	1.24	0.06	0.07
1990	408	1.24	0.06	0.07
1990	409	1.24	0.06	0.00
1990	410	1.24	0.06	0.00
1990	411	1.24	0.06	0.00
1990	412	1.24	0.06	0.00
1990	413	0.71	0.06	0.00
1990	414	0.71	0.06	0.07
1990	415	0.71	0.06	0.40
1990	416	0.71	0.06	0.40

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1990	417	0.71	0.06	0.40
1990	418	0.71	0.06	0.07
1990	419	0.71	0.06	0.07
1990	420	0.71	0.06	0.07
1990	421	0.71	0.06	0.07
1990	422	0.71	0.06	0.40
1990	423	0.51	0.06	0.40
1990	424	0.51	0.32	2.15
1990	425	0.51	0.32	3.72
1990	426	0.51	4.69	8.50
1990	427	0.51	1.73	3.72
1990	428	0.51	0.86	3.72
1990	429	0.71	0.86	5.82
1990	430	1.24	25.92	25.92
		27.05	64.00	66.27
1990	501	1.94	44.99	25.92
1990	502	2.84	52.78	20.49
1990	503	4.60	20.90	20.49
1990	504	6.06	20.90	20.49
1990	505	11.95	12.74	15.80
1990	506	18.78	16.52	15.80
1990	507	18.78	16.52	15.80
1990	508	20.38	16.52	15.80
1990	509	22.05	16.52	15.80
1990	510	22.05	16.52	15.80
1990	511	18.78	12.74	15.80
1990	512	22.05	12.74	15.80
1990	513	18.78	12.74	15.80
1990	514	18.78	12.74	15.80
1990	515	18.78	12.74	15.80
1990	516	22.05	16.52	20.49
1990	517	13.17	9.53	11.82
1990	518	10.80	4.69	11.82
1990	519	10.80	4.69	11.82
1990	520	13.17	4.69	11.82
1990	521	15.83	9.53	11.82
1990	522	10.80	4.69	8.50
1990	523	9.72	3.00	8.50
1990	524	9.72	3.00	5.82
1990	525	9.72	3.00	3.72
1990	526	7.76	3.00	2.15
1990	527	6.88	3.00	1.06
1990	528	8.71	3.00	0.40
1990	529	13.17	1.73	0.40
1990	530	11.95	1.73	0.40
1990	531	17.27	1.73	0.07
		418.13	376.19	371.76
1990	601	13.17	1.73	0.40
1990	602	29.53	1.73	0.40
1990	603	38.36	1.73	0.40
1990	604	22.05	0.86	0.40
1990	605	18.78	0.86	0.40
1990	606	25.63	0.86	0.40
1990	607	22.05	0.86	0.40
1990	608	22.05	0.86	0.40
1990	609	13.17	0.32	0.40
1990	610	13.17	0.32	0.40
1990	611	15.83	0.32	0.07

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1990	612	13.17	0.32	0.07
1990	613	13.17	0.32	0.07
1990	614	13.17	0.32	0.07
1990	615	14.46	0.32	0.07
1990	616	13.17	0.32	0.07
1990	617	9.72	0.86	0.07
1990	618	7.76	1.73	0.07
1990	619	10.80	1.73	0.07
1990	620	10.80	3.00	0.07
1990	621	13.17	3.00	0.07
1990	622	8.71	3.00	0.07
1990	623	7.76	3.00	0.07
1990	624	7.76	1.73	0.07
1990	625	6.88	1.73	0.07
1990	626	6.88	1.73	0.40
1990	627	6.88	0.86	0.40
1990	628	6.88	0.86	1.06
1990	629	8.71	0.86	1.06
1990	630	6.88	0.86	1.06
		420.50	37.00	9.05
1990	701	18.78	1.73	2.15
1990	702	14.46	1.73	3.72
1990	703	8.71	0.86	2.15
1990	704	3.96	3.00	1.06
1990	705	3.96	1.73	1.06
1990	706	3.96	1.73	1.06
1990	707	3.96	1.73	0.40
1990	708	3.96	0.86	0.40
1990	709	3.96	0.86	1.06
1990	710	3.96	0.86	0.40
1990	711	3.96	1.73	1.06
1990	712	3.96	0.86	2.15
1990	713	5.30	1.73	2.15
1990	714	5.30	1.73	2.15
1990	715	5.30	1.73	2.15
1990	716	3.96	1.73	0.40
1990	717	3.96	1.73	0.00
1990	718	3.96	0.86	0.00
1990	719	3.37	0.86	0.00
1990	720	2.84	0.86	0.00
1990	721	2.84	0.32	0.00
1990	722	2.84	0.32	1.06
1990	723	2.84	0.32	0.40
1990	724	2.84	0.32	0.00
1990	725	1.94	1.73	0.00
1990	726	1.94	4.69	0.00
1990	727	1.94	3.00	0.00
1990	728	1.94	3.00	0.00
1990	729	1.94	1.73	0.00
1990	730	1.57	1.73	0.00
1990	731	0.96	0.86	0.00
		135.16	46.97	24.98
sum winter 90		1094	696	667
1990	801	0.96	0.86	0.00
1990	802	0.96	0.86	0.00
1990	803	0.96	1.73	0.00
1990	804	0.96	1.73	0.40
1990	805	0.96	0.32	1.06
1990	806	0.71	0.06	0.40

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1990	807	0.71	1.73	0.40
1990	808	0.71	1.73	1.06
1990	809	0.71	0.86	1.06
1990	810	0.71	0.86	1.06
1990	811	0.35	0.86	0.40
1990	812	0.35	0.86	0.40
1990	813	0.35	0.32	1.06
1990	814	0.35	0.32	2.15
1990	815	0.51	0.32	3.72
1990	816	0.96	0.32	3.72
1990	817	1.24	1.73	2.15
1990	818	1.24	3.00	2.15
1990	819	1.24	3.00	1.06
1990	820	1.24	0.86	0.40
1990	821	1.24	0.86	0.40
1990	822	0.96	0.86	0.40
1990	823	0.96	0.32	0.40
1990	824	0.71	0.32	1.06
1990	825	0.71	0.32	0.40
1990	826	0.71	0.32	0.40
1990	827	0.71	0.86	1.06
1990	828	0.71	0.86	1.06
1990	829	0.71	0.32	1.06
1990	830	0.71	0.86	1.06
1990	831	0.71	0.86	2.15
		25.05	29.07	32.09
1990	901	0.96	0.86	1.06
1990	902	0.96	0.86	1.06
1990	903	0.96	1.73	1.06
1990	904	0.96	0.86	8.50
1990	905	1.24	0.86	5.82
1990	906	1.94	0.32	2.15
1990	907	2.37	3.00	1.06
1990	908	1.94	9.53	1.06
1990	909	1.57	6.86	1.06
1990	910	1.24	4.69	1.06
1990	911	1.24	1.73	1.06
1990	912	0.96	0.86	1.06
1990	913	0.96	0.86	1.06
1990	914	0.96	0.86	2.15
1990	915	0.96	1.73	1.06
1990	916	0.96	1.73	1.06
1990	917	0.96	3.00	1.06
1990	918	0.96	1.73	2.15
1990	919	0.96	1.73	5.82
1990	920	2.37	1.73	8.50
1990	921	3.96	1.73	3.72
1990	922	2.37	4.69	2.15
1990	923	1.94	6.86	2.15
1990	924	1.24	9.53	1.06
1990	925	1.24	3.00	1.06
1990	926	0.96	1.73	2.15
1990	927	0.96	1.73	2.15
1990	928	1.24	0.86	8.50
1990	929	5.30	1.73	8.50
1990	930	3.37	0.86	3.72
		47.93	78.28	84.11
1990	1001	2.37	6.86	2.15

Year	Date	SOG1 mm	SOG2 mm	SOG4 mm
1990	1002	1.94	9.53	5.82
1990	1003	1.57	6.86	3.72
1990	1004	1.24	4.69	3.72
1990	1005	1.24	4.69	3.72
1990	1006	1.24	4.69	3.72
1990	1007	0.96	3.00	2.15
1990	1008	0.71	4.69	1.06
1990	1009	1.24	4.69	8.50
1990	1010	1.24	3.00	11.82
1990	1011	1.24	1.73	11.82
1990	1012	1.24	4.69	11.82
1990	1013	1.24	6.86	20.49
1990	1014	1.24	6.86	11.82
1990	1015	1.24	4.69	11.82
1990	1016	1.24	4.69	11.82
1990	1017	1.24	9.53	11.82
1990	1018	1.24	6.86	11.82
1990	1019	1.57	4.69	8.50
1990	1020	1.57	6.86	8.50
1990	1021	1.24	4.69	5.82
1990	1022	1.24	3.00	3.72
1990	1023	1.24	1.73	1.06
1990	1024	0.96	1.73	0.40
1990	1025	0.71	1.73	0.40
1990	1026	0.71	0.86	0.40
1990	1027	0.51	0.86	0.07
1990	1028	0.35	0.86	0.07
1990	1029	0.35	0.32	1.06
1990	1030	0.35	0.32	0.40
1990	1031	0.35	0.06	0.40
		34.81	126.35	180.39
1990	1101	0.35	0.32	0.07
1990	1102	0.35	0.32	0.00
1990	1103	0.22	0.32	0.00
		0.93	0.96	0.07
sum summer		353.7	305.7	326.2
sum year		1447.5	1001.9	992.9

APPENDIX 3

Appendix 3. Sogndal. Precipitation

Sogndal precipitation data 1987-88. Units: ueq/l.

Year	Date	MM	PH	CA	MG	NA	K	NH4N	CL	SULF	NO3N	SUM +	SUM -
1987	1130	4.0	4.48	10.98	9.38	45.24	10.24	35.00	46.25	39.94	29.29	143.95	115.47
1987	1207	11.1	4.14	7.49	14.32	65.25	12.03	15.71	78.40	71.76	22.86	187.25	173.01
1987	1214	52.5	4.74	2.99	4.44	20.88	3.33	2.86	22.00	9.98	7.86	52.70	39.84
1987	1221	29.3	5.10	8.48	23.70	105.27	9.73	10.00	120.41	18.10	0.71	165.13	139.22
1987	1228	22.3	5.17	4.49	5.60	29.15	7.17	5.00	30.74	7.49	3.57	58.16	41.80
1988	101	3.5	4.80	10.48	7.74	97.44	36.86	21.43	97.85	19.34	0.71	189.80	117.91
1988	104	15.6	5.04	9.48	17.78	120.93	34.56	47.14	131.69	26.83	10.71	239.01	169.24
1988	111	9.2	4.37	10.48	7.32	57.86	19.20	29.29	66.55	36.82	32.86	166.80	136.23
1988	118	5.7	4.28	7.49	4.86	48.29	20.99	17.14	50.20	34.94	43.57	151.24	128.71
1988	125	1.8	6.15	74.85	21.89	115.71	25.60	19.29	54.71	61.78	35.00	258.05	151.48
1988	201	3.3	4.29	8.48	6.91	63.08	12.03	16.43	58.09	39.94	27.14	158.22	125.17
1988	208	3.5	4.33	24.45	11.93	52.64	17.15	9.29	50.48	52.42	4.29	162.23	107.18
1988	215	19.4	4.44	5.99	5.18	18.71	4.61	6.43	18.33	14.77	15.00	77.22	48.10
1988	222	0.0											
1988	301	9.6	4.50	3.99	6.09	26.10	2.30	5.71	23.41	13.73	11.43	75.82	48.56
1988	307	0.0											
1988	314	9.6	4.41	5.99	13.09	55.25	3.33	9.29	54.14	34.94	15.71	125.84	104.80
1988	321	0.0											
1988	328	3.5	4.37	6.49	3.54	33.50	10.50	22.14	30.46	25.58	27.14	118.82	83.18
1988	401	0.0											
1988	404	19.4	5.19	3.49	6.83	31.76	1.02	1.43	29.33	7.49	0.71	50.99	37.53
1988	411	52.6	4.55	7.98	10.12	45.68	4.10	14.29	43.15	34.11	17.86	110.35	95.12
1988	418	2.2	4.41	23.45	16.87	97.44	26.37	77.86	102.65	94.85	52.86	280.89	250.35
1988	425	1.3	5.23	3.99	2.39	29.58		8.57		5.62	5.00		
1988	502	21.0	4.09	6.99	1.23	13.49	5.12	38.57	13.54	68.64	33.57	146.68	115.75
1988	509	0.0											
1988	516	1.1	5.08	36.93	20.41	42.20	24.32	35.71		54.29	34.29		
1988	523	3.8	4.17	15.97	5.02	6.96	5.12	66.43	0.56	116.06	26.43	167.11	143.06
1988	530	1.2	4.55	16.97	9.88	23.93		50.71		66.14	37.14		
1988	601	7.3	4.47	3.99	1.81	6.96	1.79	32.86	9.87	34.32	28.57	81.30	72.76
1988	606	0.0											
1988	613	0.0											
1988	620	0.0											
1988	627	10.5	4.48	9.98	5.51	8.27	10.24	22.86	11.28	37.44	27.14	89.97	75.86
1988	701	15.0	4.69	5.49	1.48	1.74	2.05	8.57	0.85	20.59	7.14	39.75	28.58
1988	704	20.4	4.59	2.00	1.56	6.09	2.82	13.57	5.64	22.46	14.29	51.74	42.39
1988	711	21.3	4.80	3.99	1.89	4.35	2.05	4.29	3.95	13.10	7.14	32.42	24.19
1988	718	38.9	5.26	2.00	2.47	1.74	4.61	26.43	1.69	13.10	8.57	42.74	23.37
1988	725	29.0	5.54	3.99	4.44	12.18	5.12	25.71	11.84	13.73	8.57	54.33	34.14
1988	801	22.0	6.20	4.99	4.20	3.92	5.89	35.71	3.38	6.86	2.86	55.34	13.11
1988	808	4.5	4.98	4.49	4.61	5.66	3.07	24.29	5.92	21.22	15.00	52.58	42.14
1988	815	42.7	4.68	2.50	1.23	6.96	7.17	6.43	11.00	16.22	8.57	45.18	35.79
1988	822	7.3	4.66	2.00	3.37	10.88	1.02	2.86	11.84	12.48	9.29	42.00	33.61
1988	829	8.6	4.91	2.00	0.91	4.35	1.28	5.00	4.51	8.11	6.43	25.83	19.05
1988	901	3.5	4.23	4.99	9.22	32.63	0.77	5.71	34.40	39.31	28.57	112.20	102.29
1988	905	3.2	4.97	10.98	5.76	25.23	1.84	20.71	18.61	39.94	17.86	75.24	76.41
1988	912	7.0	4.96	5.99	5.10	17.84	1.02	1.43	18.89	10.61	3.57	42.34	33.07
1988	919	63.7	4.89	3.49	2.22	6.96	0.26	0.71	8.74	8.11	7.14	26.53	24.00
1988	926	50.3	5.00	1.50	3.21	10.44	0.26	0.71	12.41	6.24	2.86	26.12	21.51
1988	1001	3.5	4.42	2.50	4.12	14.36	0.77	7.14	14.38	34.32	19.29	66.89	67.99
1988	1003	20.7	4.51	1.50	1.07	0.44	0.51	7.14	2.82	25.58	10.00	41.56	38.40
1988	1010	15.6	4.45	1.50	0.74	3.05	0.77	2.86	5.64	26.21	8.57	44.39	40.42
1988	1017	2.9	4.74	13.97	10.95	8.70	6.91	12.86	10.43	33.70	20.00	71.58	64.13
1988	1024	39.8	4.86	2.00	6.83	4.35	1.79	2.14	6.77	8.74	8.57	30.92	24.08
1988	1031	9.2	5.63	3.99	7.00	37.41	5.63	8.57	39.76	6.24	2.86	64.95	48.86

Sogndal precipitation 1988-89 Units: ueq/l.

Year	Date on	Date off	MM	pH	H+	CA	MG	NA	K	NH4	CL	SULF	NO3	SUM+	SUM
1988	1101	1107	15.9	5.84	1.4	11.0	25.5	165.3	17.7	39.3	194.6	28.7	4.3	260.2	227.6
1988	1107	1114	13.5	4.96	11.0	5.0	6.6	40.5	8.4	16.4	43.1	21.2	10.0	87.9	74.4
1988	1114	1121	21.3	4.93	11.7	2.5	2.5	10.9	1.5	5.7	11.8	8.1	7.9	34.8	27.8
1988	1121	1128	16.9	5.46	3.5	4.5	9.1	46.5	4.4	10.7	47.1	10.0	2.9	78.6	59.9
1988	1128	1201	10.2	5.70	2.0	3.5	3.3	36.5	15.4	12.1	41.5	5.6	4.3	72.8	51.4
1988	1201	1205	4.6	4.95	11.2	6.5	5.8	35.7	11.0	10.0	34.4	21.8	7.9	80.1	64.1
1988	1205	1212	34.4	5.71	1.9	8.0	30.5	139.2	15.1	15.7	168.6	22.5	2.1	210.4	193.2
1988	1212	1219	31.8	5.52	3.0	11.0	49.4	206.6	7.7	5.0	258.9	29.3	1.4	282.7	289.6
1988	1219	1226	35.0	5.55	2.8	14.5	71.6	304.5	15.6	10.0	322.9	40.6	2.1	419.0	365.6
1988	1226	1231	57.0	5.51	3.1	6.0	18.9	76.6	7.9	4.3	92.2	12.5	2.1	116.8	106.8
1989	102	109	26.1	5.29	5.1	10.0	13.2	73.1	10.8	22.9	77.0	25.6	15.0	135.0	117.6
1989	109	116	104.5	5.19	6.5	8.0	40.3	201.4	5.4	5.0	235.5	26.2	5.7	266.5	267.4
1989	116	123	91.7	5.13	7.4	5.5	26.3	131.4	3.8	3.6	143.8	18.7	5.0	178.0	167.5
1989	130	201	14.3	5.33	4.7	32.4	163.8	522.0	17.4	6.4	792.1	90.5	6.4	746.7	889.0
1989	201	206	34.4	5.71	1.9	14.0	53.5	265.4	22.8	31.4	314.7	38.7	4.3	389.0	357.7
1989	206	213	52.5	5.43	3.7	6.5	26.3	116.1	7.2	14.2	138.2	20.6	4.3	174.1	163.1
1989	213	220	62.4	5.36	4.4	5.0	21.4	98.3	7.4	14.6	113.1	17.5	3.6	151.1	134.1
1989	220	227	24.8	5.54	2.9	5.0	20.6	92.2	6.1	16.1	107.7	18.1	5.0	143.0	130.8
1989	301	306	8.9	4.59	25.7	7.5	10.7	85.3	15.4	10.7	100.7	30.6	32.9	155.2	164.1
1989	306	313	11.5	4.84	14.5	6.5	8.2	35.7	4.6	27.1	39.2	29.3	28.6	96.6	97.1
1989	313	320	30.3	4.94	11.5	4.5	14.0	19.1	4.6	11.4	75.6	16.2	8.6	65.1	100.4
1989	320	327	13.7	4.76	17.4	3.5	8.2	42.2	3.6	9.3	51.0	16.2	11.4	84.2	78.7
1989	327	401	26.8	4.45	35.5	3.0	2.5	13.1	1.8	12.1	17.5	31.2	19.3	67.9	68.0
1989	403	410	1.0	5.14	7.2	4.5	4.1	47.4	7.7	1.8	57.2	16.2	1.4	72.7	74.9
1989	410	417	5.4	4.47	33.9	81.3	14.8	20.9	7.2	72.1	20.3	139.2	202.1	230.2	361.6
1989	417	424	1.9	4.57	26.9	45.9	14.0	22.6	4.6	56.1	38.4	93.0	48.6	170.2	179.9
1989	424	501	2.2	5.09	8.1	14.0	8.2	20.9	2.6	32.6	26.8	30.0	23.6	86.4	80.3
1989	501	508	15.6	4.80	15.8	9.0	10.7	37.4	1.3	2.4	50.2	27.5	1.4	76.6	79.1
1989	508	515	20.4	4.97	10.7	3.0	1.6	3.0	0.5	2.2	8.7	9.4	1.4	21.1	19.5
1989	515	522	14.3	4.80	15.8	5.0	16.5	56.6	2.6	21.4	66.0	16.6	21.4	117.8	104.1
1989	522	529	7.0	4.80	15.8	5.0	8.2	20.9	2.6	50.0	30.7	16.6	72.9	102.5	120.2
1989	529	601	4.8	4.80	15.8	5.0	12.3	17.0	2.6	5.0	29.6	18.7	5.0	57.7	53.3
1989	601	605	10.5	4.80	15.8	16.5	4.9	9.1	4.4	5.0	13.5	10.0	5.0	55.7	28.5
1989	605	612	19.4	4.80	15.8	48.4	6.6	3.9	2.6	14.3	3.4	34.3	14.3	91.6	52.0
1989	619	626	15.3	5.75	1.8	6.5	4.1	5.2	3.3	33.1	7.1	12.5	8.6	54.1	28.1
1989	626	701	21.3	4.82	15.1	4.0	0.8	1.3	0.5	17.6	3.4	26.2	15.0	39.4	44.6
1989	710	717	11.8	5.55	2.8	4.0	4.9	14.4	3.1	16.0	13.8	11.2	1.4	45.2	26.5
1989	717	724	8.9	5.15	7.1	2.0	2.5	5.7	1.3	17.4	6.5	5.6	10.7	35.9	22.8
1989	724	731	16.6	4.91	12.3	3.0	2.5	2.6	1.5	6.6	3.1	11.9	1.4	28.5	16.4
1989	731	801	2.2	4.84	14.5	2.0	1.6	7.0	0.5	5.9	5.9	6.9	1.4	31.5	14.2
1989	807	814	23.9	4.72	19.1	2.5	0.8	3.5	2.0	17.9	6.2	21.8	5.0	45.8	33.0
1989	814	821	36.3	4.68	20.9	3.5	5.8	21.8	1.0	1.4	31.3	21.8	13.6	54.3	66.7
1989	821	828	47.8	4.47	33.9	2.5	0.8	6.1	0.5	5.9	10.4	27.5	20.0	49.7	57.9
1989	828	901	4.5	5.01	9.8	2.0	2.5	8.7	2.3	7.7	11.0	13.7	1.4	33.0	26.2
1989	901	904	3.2	5.31	4.9	1.0	0.8	11.3	2.6	0.7	13.8	4.4	1.4	21.3	19.6
1989	904	911	9.2	5.18	6.6	4.5	12.3	63.1	6.4	2.6	69.7	15.0	1.4	95.5	86.1
1989	911	918	20.1	4.49	32.4	2.0	2.5	8.7	1.3	0.7	10.2	33.1	3.6	47.5	46.8
1989	918	925	31.8	4.37	42.7	4.0	4.9	20.0	2.3	13.0	21.7	43.7	20.7	86.9	86.1
1989	925	1001	17.5	5.10	7.9	4.0	8.2	44.8	9.0	0.7	48.8	16.2	1.4	74.6	66.4
1989	1001	1002	7.0	5.92	1.2	8.5	24.7	121.8	7.4	9.6	166.7	14.4	1.4	173.2	182.4
1989	1002	1009	4.8	5.04	9.1	7.5	9.1	43.1	14.3	2.0	48.2	42.4	1.4	85.1	92.1
1989	1009	1016	17.5	5.60	2.5	8.0	6.6	30.5	8.7	7.2	33.0	13.7	7.1	63.4	53.9
1989	1016	1023	24.2	4.56	27.5	3.0	6.6	24.4	3.3	7.6	33.8	26.2	21.4	72.5	81.5
1989	1023	1030	58.0	5.11	7.8	2.0	7.4	25.7	1.0	2.6	36.7	9.4	1.4	46.4	47.4
snow 1989 sample 1				4.99	10.2	2.5	6.6	31.8	1.5	1.1	36.7	14.6	5.5	43.5	56.7
snow 1989 sample 2				5.14	7.2	2.0	4.9	25.2	1.0	1.0	31.0	10.4	3.6	34.2	45.0
snow 1989 sample 3				5.03	9.3	2.5	9.1	40.9	1.5	1.4	50.8	14.6	3.8	55.4	69.1

Sogndal precip 1989-90 Units: ueq/l 27-Mar 91

Year	Date on	Date off	MM	pH	H+	CA	MG	NA	K	NH4	CL	SULF	NO3	SUM+	SUM-
1989	1101	1106	1.9	4.66	21.9	12.0	7.4	38.3	16.1	22.9	44.6	41.2	36.4	96.6	122.2
1989	1106	1113	15.3	4.78	16.6	4.5	7.4	34.8	6.9	10.0	42.9	18.3	10.7	63.6	71.9
1989	1113	1120	9.6	4.98	10.5	3.5	7.4	25.2	1.3	0.7	33.0	10.2	0.7	38.1	43.9
1989	1120	1127	14	4.8	15.8	3.0	9.1	34.4	4.4	14.3	45.1	23.3	11.4	65.0	79.8
1989	1201	1204	4.8	5.09	8.1	10.0	14.8	99.2	18.4	54.3	112.5	19.3	21.4	196.7	153.3
1989	1204	1211	15.9	5.56	2.8	10.0	28.8	172.3	20.2	45.7	188.1	12.5	13.6	277.0	214.1
1989	1211	1218	8	5.79	1.6	20.5	20.6	198.8	44.8	80.0	204.2	2.5	17.9	364.6	224.5
1989	1225	101	15.3	4.65	22.4	5.0	21.4	94.8	4.6	15.7	106.5	17.7	16.4	141.5	140.6
1990	101	108	5.4	4.7	20.0	10.0	7.4	86.6	13.6	40.0	91.9	25.6	45.7	157.5	163.2
1990	108	115	37.6	5.16	6.9	8.5	34.6	168.8	6.9	12.9	198.5	27.5	5.0	231.6	231.0
1990	115	122	103.5	5.47	3.4	4.5	13.2	69.2	3.8	7.1	75.9	8.1	2.9	97.8	86.8
1990	122	129	17.8	4.76	17.4	2.5	6.6	32.2	3.1	9.3	40.0	16.2	13.6	53.6	69.8
1990	129	201	8.9	5.76	1.7	12.0	14.8	130.5	32.5	62.1	180.2	20.6	33.6	251.9	234.4
1990	201	205	7	5.89	1.3	20.0	21.4	206.6	23.3	141.4	229.5	43.1	29.3	412.7	301.9
1990	205	212	43.3	4.89	12.9	4.5	11.5	53.9	3.3	17.1	69.4	23.7	11.4	90.4	104.5
1990	212	219	14	4.83	14.8	5.5	4.9	32.6	6.7	21.4	39.5	20.0	18.6	71.1	78.0
1990	219	226	45.9	5.02	9.5	5.0	18.9	98.7	4.4	12.1	121.8	30.0	8.6	139.2	160.3
1990	226	301	12.1	5.38	4.2	4.0	4.9	46.1	8.2	24.3	56.7	8.1	11.4	87.5	76.2
1990	301	305	29.9	5.68	2.1	3.5	13.2	76.1	5.1	20.0	85.7	15.6	4.3	117.9	105.6
1990	305	312	73.9	4.99	10.2	8.5	39.5	167.9	3.8	5.0	222.2	30.0	2.1	224.7	254.3
1990	312	319	52.3	5.45	3.5	5.5	4.9	20.4	3.3	13.6	26.2	9.4	5.7	47.8	41.3
1990	319	326	76.5	5.7	2.0	7.0	15.6	67.0	6.9	20.7	82.1	16.8	9.3	117.2	108.2
1990	326	401	22.6	5.32	4.8	8.5	30.5	137.5	4.9	15.7	178.8	29.3	6.4	197.0	214.5
1990	401	402	9.9	4.87	13.5	5.0	5.8	33.9	7.7	35.0	40.0	31.4	20.7	87.4	92.2
1990	409	416	8.3	4.09	81.3	7.5	8.2	33.9	3.8	62.1	42.6	81.7	61.4	115.6	185.8
1990	423	430	10.8	5.4	4.0	12.0	8.2	39.2	8.4	82.9	48.8	74.3	51.4	150.7	174.5
1990	430	521	8.9	5.23	5.9	19.5	2.5	13.1	2.6	3.6	16.4	6.2	7.1	41.1	29.7
1990	521	528	10.8	5.53	3.0	6.5	4.9	17.0	3.1	25.7	20.0	17.5	7.1	57.2	44.6
1990	601	604	3.6	3.82	151.4	11.5	6.6	21.3	2.0	57.1	31.3	127.9	110.7	98.6	269.9
1990	618	625	15	4.56	27.5	4.5	1.6	4.4	3.3	21.4	4.8	40.6	22.1	35.2	67.5
1990	625	701	14	4.27	53.7	2.5	3.3	17.8	2.3	20.7	18.6	59.3	28.6	46.6	106.5
1990	701	702	7.6	4.68	20.9	1.0	0.8	5.2	1.3	3.6	4.2	19.3	10.7	11.9	34.3
1990	702	709	2.6	4.59	25.7	2.5	4.9	16.5	4.9	21.4	10.7	45.6	17.9	50.3	74.1
1990	709	716	19.7	5.17	6.8	0.5	2.5	7.8	1.3	10.0	7.6	13.7	4.3	22.1	25.6
1990	723	730	6.7	3.82	151.4	18.0	9.1	15.7	12.3	108.6	18.3	177.2	97.1	163.5	292.7
1990	730	801	6.4	6.48	0.3	27.4	62.5	80.9	120.3	-7.1	76.1	192.2	20.7	284.2	289.0
1990	801	806	12.7	4.34	45.7	8.0	2.5	14.4	4.4	71.4	17.5	69.9	49.3	100.6	136.7
1990	806	813	8	5.62	2.4	1.0	2.5	16.5	4.1	29.3	16.6	11.2	6.4	53.4	34.3
1990	813	820	24.2	4.51	30.9	0.5	0.8	1.7	0.5	12.1	3.1	23.7	12.9	15.7	39.7
1990	820	827	8	4.87	13.5	1.5	7.4	30.5	1.0	7.1	33.8	13.7	8.6	47.5	56.1
1990	827	901	15.9	4.45	35.5	2.5	1.6	6.1	1.8	16.4	7.1	43.1	17.1	28.5	67.2
1990	903	910	7.3	4.81	15.5	0.5	0.8	3.0	0.3	0.7	2.8	11.2	8.6	5.3	22.6
1990	910	917	8.3	5.09	8.1	6.5	10.7	74.0	12.0	19.3	75.3	22.5	4.3	122.5	102.0
1990	917	924	25.2	5.19	6.5	1.0	3.3	14.4	0.3	0.7	16.1	4.4	2.1	19.6	22.6
1990	924	1001	35	5.32	4.8	2.5	2.5	30.9	9.0	7.1	29.3	8.7	7.1	52.0	45.2
1990	1001	1008	23.6	4.88	13.2	1.0	1.6	6.5	0.3	4.3	9.3	10.6	7.1	13.7	27.1
1990	1008	1015	51.6	4.99	10.2	9.5	9.9	32.6	1.0	0.7	43.4	16.8	4.3	53.7	64.6
1990	1015	1022	8.9	4.63	23.4	10.5	3.3	6.1	0.5	13.6	6.5	31.4	13.6	33.9	51.5

APPENDIX 4

Appendix 4. Sogndal. Runoff chemistry

Runoff chemistry. SOG1. Units: ueq/l, ug Al/l, mgC/l, mg SiO2/l

DATE	PH	NA	K	CA	MG	NO3N	CL	SO4	ALK-X	RAL	ILAL	TOC	SIO2
880504	5.50	53.9	3.1	34.9	17.3	4.8	56.4	35.4	13.1	19	10	0.60	1.9
880506	5.32	50.9	2.0	28.4	16.5	5.1	56.4	35.4	1.6	44	10	0.58	1.6
880508	5.30	47.4	1.8	24.0	15.6	4.1	53.6	31.2	0.0	41	10	0.77	1.4
880510	5.51	40.9	1.8	19.5	13.2	2.6	45.1	27.0	5.3	34	10	0.78	1.2
880512	5.79	40.5	1.5	19.5	13.2	2.7	45.1	29.1	0.0	29	10	0.71	1.3
880514	5.46	36.1	1.3	17.0	11.5	2.2	39.5	25.0	0.0	29	10	0.60	1.2
880516	5.43	32.2	1.3	15.5	9.9	1.9	33.8	25.0	0.0	27	10	0.54	1.1
880518	5.66	28.7	1.8	14.0	9.1	1.6	31.0	20.8	0.0	22	10	0.52	1.0
880521	5.35	27.8	1.0	14.5	9.1	1.1	31.0	20.8	0.0	26	10	0.47	1.0
880524	5.64	27.4	1.0	15.5	9.9	1.0	28.2	20.8	10.9	18	10	0.52	1.0
880527	5.73	26.1	1.0	16.5	9.1	0.5	25.4	18.7	10.9	10	10	0.39	1.1
880530	5.71	23.1	1.3	14.5	8.2	0.4	25.4	20.8	7.6	10	10	0.58	0.8
880602	5.65	25.2	1.3	15.0	8.2	0.4	25.4	20.8	6.4	10	10	0.68	1.0
880604	5.95	25.7	1.5	15.5	8.2	0.2	25.4	16.6	7.6	10	10	0.74	1.1
880605	5.78	26.1	1.5	15.5	8.2	0.1	28.2	20.8	1.6	10	10	0.66	1.1
880606	5.68	26.1	1.3	16.0	8.2	0.5	25.4	20.8	5.3	10	10	0.66	1.1
880611	5.67	28.3	2.3	16.5	8.2	0.1	25.4	18.7	9.8	10	10	0.88	1.0
880625	5.51	34.4	2.6	18.0	11.5	1.4	31.0	27.0	5.3	16	10	1.60	1.7
880702	5.67	31.8	1.5	15.0	9.9	0.3	28.2	25.0	6.4	10	10	1.17	0.8
880704	5.65	30.0	1.3	14.5	9.9	0.4	25.4	22.9	6.4	12	10	1.38	0.7
880706	5.69	30.9	1.5	22.0	15.6	0.1	28.2	22.9	7.6	10	10	1.42	0.7
880708	5.77	31.8	1.8	20.0	13.2	0.1	28.2	25.0	8.7	10	10	1.74	0.7
880710	5.72	33.1	2.0	18.5	10.7	0.4	28.2	27.0	6.4	10	10	1.23	0.8
880716	6.16	32.6	1.3	17.5	9.9	0.1	28.2	29.1	5.3	10	10	0.92	0.9
880723	5.84	36.5	2.6	18.0	10.7	0.4	33.8	27.0	5.3	10	10	1.10	0.9
880730	5.68	33.5	1.3	17.5	9.9	0.1	28.2	25.0	1.6	10	10	0.89	1.1
880806	5.92	34.8	1.5	19.0	9.9	0.1	28.2	27.0	9.8	10	10	0.85	1.2
880814	6.21	34.8	1.5	19.0	9.9	0.1	28.2	27.0	6.4	10	10	0.94	1.2
880815	6.02	33.5	1.3	18.0	9.9	0.2	28.2	25.0	6.4	10	10	0.94	1.2
880816	5.81	35.2	1.5	17.5	9.9	0.1	28.2	25.0	9.8	10	10	1.23	-99.0
880820	5.88	36.1	1.5	18.0	9.9	0.5	28.2	25.0	9.8	10	10	0.89	1.4
880827	5.89	35.2	1.3	20.0	10.7	0.1	28.2	25.0	10.9	10	10	1.03	1.5
880903	6.26	35.7	1.3	19.0	9.9	0.1	28.2	27.0	9.8	10	10	0.70	1.4
880905	5.97	36.5	1.8	19.5	9.9	0.1	28.2	27.0	10.9	15	11	1.89	1.4
880910	6.49	37.8	1.8	21.5	9.9	0.7	31.0	27.0	12.0	12	10	1.15	1.5
880917	6.01	37.4	2.0	23.5	10.7	2.6	31.0	29.1	17.5	10	10	2.59	1.5
880924	6.00	35.2	1.5	20.5	9.1	0.4	31.0	27.0	10.9	12	11	0.89	1.6
880929	5.96	33.9	1.3	20.5	9.1	0.4	28.2	22.9	14.2	10	10	0.87	1.7
880930	6.03	35.2	1.5	21.0	9.1	0.2	25.4	20.8	13.1	12	10	0.98	1.7
881001	6.13	33.5	1.5	22.0	9.1	0.3	28.2	31.2	12.0	10	10	0.99	1.7
881002	6.10	33.5	1.3	26.4	9.1	0.3	25.4	29.1	13.1	10	10	0.84	1.8
881006	6.00	33.9	1.5	21.0	9.1	0.4	25.4	25.0	16.4	10	10	0.82	1.7
881008	6.07	33.5	1.3	21.5	9.1	0.4	25.4	20.8	18.6	10	10	0.88	1.6
881015	6.10	36.1	0.5	23.5	9.1	0.5	25.4	25.0	18.6	10	10	1.53	1.7
881021	6.18	36.5	0.5	24.0	9.1	0.4	25.4	25.0	19.7	10	10	0.87	1.7
881028	6.30	37.8	1.3	24.0	9.9	0.6	25.4	27.0	22.9	10	10	0.70	1.8
881104	6.10	37.4	1.0	25.4	9.1	0.6	28.2	25.0	16.4	10	10	0.74	1.9
881111	5.98	31.3	0.8	25.9	9.1	0.4	22.6	25.0	19.7	10	10	0.87	2.0
881118	6.26	37.0	0.8	21.0	9.9	0.9	31.0	29.1	12.0	10	10	0.40	1.7
881125	5.87	38.3	1.0	21.0	9.1	0.9	31.0	25.0	18.6	10	10	0.61	1.8

Runoff chemistry. SOG2. Units: ueq/l, ug Al/l, mg C/l, mg SiO2/l.

DATE/TIME	PH	NA	K	CA	MG	NO3N	CL	SO4	ALK-X	RAL	ILAL	TOC	SIO2
8805040000	4.49	53.5	2.8	38.9	23.0	17.9	56.4	124.8	0.0	342	11	2.09	1.7
8805060000	4.83	53.1	5.1	36.4	21.4	12.1	50.8	89.4	0.0	255	10	4.55	1.4
8805080000	4.83	34.8	1.5	28.9	16.5	7.4	36.7	66.6	0.0	182	11	0.81	1.3
8805100000	4.87	37.8	1.3	31.9	18.1	4.6	39.5	60.3	0.0	76	11	0.86	1.6
8805120000	5.09	32.6	1.3	26.9	15.6	3.2	36.7	58.2	0.0	71	10	0.84	1.4
8805140000	5.02	29.1	0.8	27.4	14.8	2.4	31.0	54.1	0.0	73	10	0.75	1.4
8805160000	5.13	23.9	0.8	23.5	13.2	1.6	25.4	39.5	0.0	69	10	0.71	1.2
8805180000	5.22	25.7	0.5	24.0	12.3	1.5	25.4	45.8	0.0	58	10	0.85	1.4
8805210000	5.19	28.3	1.5	26.4	14.8	1.6	28.2	43.7	0.0	50	10	2.05	1.5
8805240000	5.20	21.8	0.8	20.0	10.7	1.4	22.6	39.5	2.9	56	10	0.71	1.1
8805270000	5.32	13.5	0.5	15.5	8.2	1.0	16.9	27.0	0.0	43	10	0.56	0.8
8805300000	5.29	15.2	0.8	15.0	6.6	0.9	36.7	16.6	0.0	37	10	0.74	0.5
8806020000	5.36	17.8	0.8	18.0	8.2	0.5	19.7	33.3	0.0	14	10	0.95	1.0
8806040000	5.46	17.8	0.8	19.0	8.2	0.4	16.9	31.2	0.0	15	10	0.73	1.2
8806050000	5.42	18.7	0.8	21.0	9.1	0.2	16.9	27.0	0.0	10	10	0.91	1.3
8806060000	5.25	14.4	1.3	12.0	5.8	1.1	14.1	25.0	0.0	26	10	0.65	0.7
8806110000	5.42	21.3	0.8	21.5	9.9	0.1	19.7	33.3	0.0	10	10	0.99	1.2
8806120000	5.40	22.2	1.0	22.5	9.9	0.1	19.7	37.4	0.0	10	10	1.09	1.3
8806130000	5.44	22.6	1.3	22.5	9.9	0.1	19.7	35.4	0.0	10	10	1.05	1.3
8806150600	5.25	22.6	0.5	22.0	10.7	0.1	19.7	35.4	0.0	17	10	1.02	1.3
8806150815	4.93	22.6	0.5	22.0	10.7	0.1	19.7	43.7	0.0	31	10	1.13	1.3
8806151050	4.98	23.5	0.8	22.5	11.5	0.1	22.6	43.7	0.0	36	10	1.06	1.4
8806151200	5.04	22.6	0.5	22.5	10.7	0.1	19.7	43.7	0.0	28	10	1.08	1.4
8806151400	5.07	22.6	0.8	23.0	11.5	0.1	19.7	41.6	0.0	31	10	1.18	1.4
8806151600	5.06	23.5	0.5	25.4	11.5	0.1	22.6	43.7	0.0	31	10	1.12	1.4
8806151850	5.06	23.9	0.5	25.4	11.5	0.2	22.6	45.8	0.0	39	10	1.11	1.4
8806171145	5.61	27.4	0.5	29.9	14.8	0.1	22.6	64.5	0.0	136	10	5.93	1.6
8806171300	5.02	27.8	0.8	30.4	14.8	0.2	25.4	66.6	0.0	103	10	1.1	1.6
8806171630	4.46	27.8	0.8	31.4	14.8	0.1	22.6	64.5	0.0	126	10	6.07	1.6
8806180845	4.73	28.3	0.8	30.4	14.8	0.1	22.6	64.5	0.0	128	10	6.27	1.6
8806190000	5.04	28.7	0.8	30.9	15.6	0.1	25.4	62.4	0.0	105	10	1.1	1.6
8806200000	5.09	30.0	0.8	32.9	15.6	0.1	25.4	62.4	0.0	96	10	1.1	1.6
8806210000	5.08	30.9	1.3	32.9	15.6	0.1	28.2	70.7	0.0	70	10	1.1	1.7
8806220000	5.12	32.2	1.8	32.9	15.6	0.3	28.2	64.5	0.0	76	10	1.2	1.7
8806221145	4.76	30.9	0.5	32.9	16.5	0.1			0.0	111	10	4.69	
8806230000	5.04	31.8	1.0	33.4	17.3	0.4	28.2	68.6	0.0	94	10	1.17	1.7
8806240000	5.13	32.6	1.5	33.4	16.5	0.2	28.2	64.5	0.0	89	10	0.95	1.7
8806250000	5.20	34.8	1.8	14.5	16.5	0.1	31.0	68.6	0.0	63	10	1.15	0.9
8806260000	5.04	33.1	1.0	33.9	17.3	0.1	28.2	77.0	0.0	76	10	1	1.7
8806300220	5.05	34.4	2.3	35.4	17.3	0.3	28.2	70.7	0.0	85	10	1.13	1.8
8806301800	5.13	34.4	1.8	34.4	17.3	0.3	28.2	70.7	0.0	85	10	1.35	1.8
8806302000	5.08	34.4	1.5	34.4	17.3	0.5	28.2	79.0	0.0	89	10	1.28	1.8
8807020930	5.01	34.8	1.0	34.9	17.3	0.1	28.2	72.8	0.0	74	10	1.34	1.8
8807040000	5.10	33.5	1.3	32.4	15.6	0.3	28.2	66.6	0.0	94	10	1.25	1.7
8807060000	5.13	33.5	1.0	38.9	21.4	0.1	28.2	66.6	0.0	73	10	1.27	1.8
8807080000	5.16	34.4	1.0	38.4	20.6	0.1	28.2	66.6	0.0	69	10	1.17	1.8
8807100000	5.12	34.4	1.0	35.4	16.5	0.1	28.2	70.7	0.0	59	10	1.05	1.9
8807160000	5.41	35.2	0.8	34.9	15.6	0.1	28.2	64.5	0.0	56	10	0.83	1.9
8807230000	5.40	41.3	2.6	32.9	15.6	0.7	36.7	64.5	0.0	41	10	1.3	1.8
8807300000	5.34	33.9	0.5	33.9	14.8	0.1	28.2	60.3	0.0	34	10	1.07	2.1
8808060000	5.50	33.9	0.8	32.9	14.0	0.1	28.2	52.0	0.0	29	10	0.95	2.1
8808122015	5.67	33.9	1.0	31.9	14.0	0.1	28.2	47.8	0.0	26	10	1.08	2.2
8808130145	5.50	33.5	1.0	30.9	13.2	0.1	28.2	62.4	0.0	29	10	1.02	2.1

File: SOG2-K88.WK1

8808130930	5.36	33.9	1.0	31.4	14.8	0.1	31.0	58.2	0.0	50	10	0.96	2.2
8808140000	5.51	34.4	0.8	34.9	14.8	0.1	28.2	58.2	0.0	38	10	1.07	2.3
8808150000	5.40	32.2	0.8	32.9	14.0	0.2	28.2	54.1	0.0	43	10	0.89	2.2
8808160000	5.44	33.1	0.8	32.9	14.0	0.1	28.2	56.2	0.0	42	10	1.31	2.3
8808170000	5.56	34.4	0.8	34.4	14.0	0.1	28.2	56.2	2.9	26	10	0.94	2.3
8808180000	5.54	33.9	0.5	33.9	13.2	0.1	28.2	56.2	0.0	40	10	0.75	2.3
8808190000	5.63	35.2	1.0	36.9	14.0	0.5	28.2	56.2	4.1	35	10	0.77	2.3
8808200000	5.36	33.9	0.8	32.9	14.0	0.7	28.2	56.2	0.0	37	10	0.88	2.4
8808210000	5.41	33.1	0.8	33.4	14.8	0.5	25.4	52.0	0.0	35	10	0.93	2.4
8808220000	5.40	33.5	0.8	33.4	14.8	0.6	25.4	54.1	0.0	40	10	0.88	2.4
8808260000	5.54	33.9	0.8	35.4	16.5	0.2	28.2	52.0	0.0	23	10	0.97	2.5
8808270000	5.50	33.9	1.0	34.4	15.6	0.1	28.2	49.9	0.0	35	10	0.91	2.5
8809030000	5.79	34.8	1.3	31.9	14.0	0.2	28.2	52.0	0.0	25	10	0.77	2.4
8809050000	5.60	33.9	1.3	30.9	14.0	0.3	28.2	52.0	0.0	22	10	0.91	2.4
8809100000	5.71	35.7	1.5	33.4	14.8	1.1	39.5	54.1	0.0	27	11	0.96	2.5
8809170000	5.70	37.8	2.3	35.9	15.6	2.3	39.5	54.1	1.6	22	10	1.74	2.5
8809240000	5.48	31.3	1.5	30.9	13.2	0.8	31.0	49.9	0.0	47	13	1.04	2.1
8809290000	5.54	28.3	1.3	31.4	12.3	0.5	25.4	43.7	0.0	43	11	0.92	2.1
8809300000	5.52	28.7	1.5	31.4	12.3	0.6	25.4	47.8	1.6	43	10	0.84	2.1
8810010000	5.68	28.7	1.3	32.4	12.3	0.4	25.4	47.8	0.0	43	14	0.86	2.1
8810020000	5.57	28.3	1.3	33.4	12.3	0.4	25.4	43.7	1.6	43	14	0.77	2.2
8810032000	5.59	30.9	1.3	33.9	12.3	0.6	25.4	45.8	0.0	40	13	1.17	2.2
8810032300	5.52	31.3	1.5	34.4	12.3	0.6	28.2	54.1	0.0	50	13	1.09	2.2
8810040630	5.42	30.5	1.0	35.4	13.2	0.8	25.4	54.1	0.0	61	13	1.01	2.2
8810041400	5.37	31.3	1.0	36.4	14.0	0.6	25.4	56.2	0.0	77	17	0.99	2.2
8810050000	5.40	29.6	1.0	36.4	14.8	0.5	25.4	62.4	2.9	61	13	1.13	2.2
8810060000	5.44	30.5	1.3	36.9	14.8	0.8	25.4	62.4	1.6	61	13	0.99	2.2
8810070000	5.39	29.1	1.0	36.9	14.8	0.5	25.4	58.2	0.0	65	13	0.99	2.2
8810080000	5.43	29.6	0.8	36.9	14.8	0.6	25.4	54.1	4.1	46	11	1.03	2.3
8810090000	5.48	30.0	0.8	36.4	14.8	0.6	25.4	54.1	6.4	59	13	0.99	2.3
8810100000	5.47	29.1	0.8	34.9	14.0	0.6	25.4	52.0	4.1	53	11	0.91	2.2
8810110000	5.52	30.5	1.0	37.4	14.8	0.8	25.4	52.0	7.6	39	10	1.43	2.3
8810120000	5.47	33.9	2.0	38.9	14.0	0.8	28.2	54.1	5.3	50	11	1.12	2.5
8810130000	5.51	35.2	1.5	40.4	14.8	0.8	31.0	58.2	4.1	48	11	1	2.5
8810140000	5.54	35.2	0.8	40.4	15.6	1.0	28.2	58.2	5.3	40	10	1.96	2.4
8810150000	5.52	35.7	0.5	43.4	15.6	1.4	28.2	60.3	5.3	43	10	1.78	2.5
8810210000	5.69	32.2	0.5	37.9	14.0	1.1	25.4	52.0	7.6	25	10	0.85	2.4
8810280000	5.70	43.9	1.0	50.4	18.1	1.5	31.0	68.6	12.0	10	10	0.87	3.3
8811040000	5.53	34.4	0.8	38.4	14.0	0.9	28.2	52.0	0.0	15	10	0.84	2.6
8811110000	5.78	34.8	2.3	41.9	14.0	1.1	33.8	54.1	12.0	13	10	1.18	2.6
8811180000	5.58	37.0	1.0	39.9	17.3	0.6	31.0	56.2	6.4	54	23	0.85	2.4
8811250000	5.49	35.7	0.5	41.9	18.1	0.7	28.2	58.2	12.0	68	23	1.07	2.5

Runoff chemistry. SOG3. Units: ueq/l, ug Al/l, mg C/l, mg SiO2/l.

DATE/TIME	PH	NA	K	CA	MG	NO3N	CL	SO4	ALK-X	RAL	ILAL	TOC	SIO2
8805160000	5.67	26.1	1.0	13.0	9.1	0.8	28.2	20.8	4.1	22	10	0.68	0.8
8805180000	5.69	28.7	1.3	14.5	9.1	0.5	28.2	22.9	8.7	15	10	0.56	1.0
8805210000	5.65	29.1	1.3	15.5	9.1	0.2	31.0	20.8	12.0	18	10	0.73	1.2
8805240000	5.65	25.7	1.0	15.0	8.2	0.5	25.4	20.8	6.4	10	10	0.59	0.9
8805270000	5.65	23.1	1.3	12.5	7.4	0.6	25.4	16.6	4.1	10	10	0.59	0.8
8805300000	5.59	22.6	1.3	12.5	7.4	0.4	25.4	18.7	4.1	10	10	0.58	0.8
8806020000	5.63	26.5	1.5	14.5	8.2	0.1	25.4	18.7	0.0	10	10	0.58	1.3
8806040000	5.59	27.8	1.5	14.0	8.2	0.3	28.2	16.6	4.1	10	10	0.9	1.5
8806050000	5.71	29.6	1.3	14.5	8.2	0.3	28.2	18.7	0.0	10	10	0.72	1.4
8806060000	5.64	22.6	1.0	12.5	7.4	0.1	22.6	18.7	1.6	10	10	0.58	0.8
8806110000	5.72	33.1	1.3	15.0	9.1	0.2	28.2	22.9	6.4	10	10	0.79	1.5
8806180000	5.66	37.4	0.8	13.0	9.1	0.1	31.0	20.8	0.0	13	10	0.94	1.4
8806250000	5.72	43.9	1.8	17.5	9.9	0.1	36.7	25.0	6.4	10	10	1.35	1.3
8807021900	5.65	46.5	0.8	21.0	12.3	1.5	39.5	27.0	15.3	15	10	0.99	1.1
8807040000	5.77	38.3	1.5	15.0	9.9	0.6	31.0	29.1	8.7	10	10	1.51	1.3
8807060000	5.73	38.3	1.3	21.0	15.6	0.1	31.0	25.0	8.7	10	10	1.61	1.3
8807080000	5.77	37.0	1.0	20.0	14.0	0.5	28.2	22.9	9.8	10	10	1.47	1.4
8807100000	5.9	36.5	0.8	17.0	9.1	0.1	28.2	25.0	14.2	10	10	0.86	1.6
8807160000	5.98	38.7	0.5	19.5	9.9	0.4	28.2	25.0	17.5	10	10	0.95	1.6
8807230000	5.99	35.2	0.5	17.0	9.1	0.6	28.2	25.0	8.7	10	10	0.77	1.6
8807300000	5.94	36.5	0.5	18.5	9.1	0.1	28.2	29.1	7.6	10	10	0.84	1.8
8808060000	6.16	36.5	0.8	18.0	9.1	0.1	28.2	20.8	24.0	10	10	0.77	1.8
8808140000	6.09	38.7	0.8	18.0	9.1	0.1	28.2	22.9	13.1	10	10	0.8	1.7
8808150000	6.09	33.1	1.0	17.5	8.2	0.1	25.4	20.8	12.0	10	10	0.76	1.7
8808160000	6.22	33.9	1.0	18.0	9.1	0.1	25.4	20.8	17.5	10	10	0.66	1.9
8808180000	6.03	37.4	1.0	19.5	9.1	0.9	28.2	22.9	15.3	10	10	0.6	2.0
8808200000	6.01	35.7	1.0	19.0	9.9	0.4	25.4	22.9	14.2	10	10	0.8	2.0
8808270000	6.07	36.1	0.8	20.0	9.9	0.2	25.4	20.8	14.2	10	10	0.81	2.0
8809030000	6.19	37.4	0.8	18.5	8.2	0.1	25.4	22.9	13.1	10	10	0.63	1.9
8809050000	6.21	38.3	1.3	19.5	9.1	0.3	25.4	25.0	16.4	10	10	0.74	1.9
8809100000	6.17	40.9	1.5	21.5	9.1	0.7	31.0	25.0	17.5	10	10	0.57	2.0
8809170000	6.18	40.0	1.5	20.5	9.1	2.5	31.0	25.0	15.3	10	10	1.89	2.0
8809240000	5.99	32.6	1.5	20.0	8.2	0.7	28.2	20.8	9.8	12	11	0.62	2.0
8809290000	5.89	29.1	1.5	18.5	8.2	0.1	22.6	20.8	7.6	12	10	0.76	1.8
8809300000	5.9	27.8	1.0	17.5	7.4	0.1	25.4	22.9	6.4	12	10	0.65	1.7
8810010000	5.97	29.6	1.0	19.5	8.2	0.1	25.4	27.0	8.7	10	10	0.61	1.9
8810020000	6.04	30.9	1.0	20.0	8.2	0.1	25.4	22.9	9.8	10	10	0.57	2.0
8810060000	5.97	31.8	0.8	20.5	9.1	0.6	22.6	29.1	13.1	10	10	0.69	2.0
8810080000	6.07	32.2	1.0	21.5	8.2	0.5	22.6	22.9	15.3	10	10	0.72	2.1
8810150000	6.05	35.7	0.5	22.0	9.1	0.5	22.6	25.0	19.7	10	10	1.35	2.0
8810210000	6.09	33.9	0.5	22.0	9.1	0.5	22.6	25.0	19.7	10	10	0.71	2.1
8810280000	6.09	40.5	0.5	24.5	9.9	0.9	25.4	27.0	22.9	35	10	0.63	2.6
8811040000	5.93	36.5	0.5	24.5	9.9	0.4	22.6	22.9	21.8	10	10	0.55	2.2
8811110000	6.03	30.5	0.5	25.9	9.9	0.4	19.7	22.9	26.1	10	10	0.52	2.1
8811180000	6.5	34.4	0.5	21.5	9.1	0.4	25.4	31.2	14.2	10	10	0.51	1.9
8811250000	5.85	34.8	0.5	22.0	9.1	0.3	22.6	25.0	17.5	10	10	0.58	2.1

Runoff chemistry. SOG4. Units: ueq/l, ug Al/l, mg C/l, mg SiO2/l.

DATE/TIME	PH	NA	K	CA	MG	NO3N	CL	SO4	ALK-X	RAL	ILAL	TOC	SIO2
8805040000	4.81	42.6	2.3	33.9	18.1	15.7		54.1	0.0	92	14	2.96	1.5
8805060000	5.00	36.5	1.5	27.4	14.0	10.2	36.7	41.6	0.0	84	11	2.14	1.6
8805080000	5.00	30.9	1.5	24.0	12.3	7.9	28.2	35.4	0.0	82	11	2.19	1.1
8805100000	5.31	32.2	1.8	25.4	11.5	4.3	28.2	35.4	0.0	52	11	1.09	1.7
8805120000	5.34	24.8	1.8	21.0	9.9	2.8	22.6	29.1	0.0	46	11	1.17	1.1
8805140000	5.39	27.8	1.8	19.5	9.1	3.4	28.2	29.1	0.0	52	11	1.08	1.3
8805160000	5.33	20.9	1.3	15.5	7.4	2.5	19.7	20.8	0.0	48	11	1.02	0.9
8805180000	5.37	25.2	0.8	20.0	8.2	2.5	25.4	27.0	0.0	43	11	0.88	1.3
8805210000	5.42	24.8	0.8	19.0	8.2	2.0	22.6	22.9	0.0	38	10	1.43	1.2
8805240000	5.47	20.0	1.0	14.0	6.6	1.4	19.7	16.6	6.4	31	10	1.48	0.7
8805270000	5.70	19.1	1.0	16.0	6.6	0.3	22.6	14.6	10.9	25	10	1.02	0.8
8805300000	5.67	30.9	3.6	23.5	9.9	0.2	45.1	33.3	10.9	31	11	4.84	0.8
8806020000	5.61	35.7	1.3	27.9	9.9	0.3	31.0	35.4	2.9	23	10	2.08	1.8
8806040000	5.04	30.9	2.8	27.4	9.9	1.0	22.6	52.0	0.0	108	22	4.11	2.1
8806050000	5.64	39.6	2.3	27.4	9.1	0.1	33.8	31.2	1.6	23	10	2.19	1.8
8806060000	5.60	21.3	0.8	16.5	5.8	0.1	22.6	18.7	4.1	10	10	1.19	1.0
8806170000	4.81	29.6	1.5	13.5	9.1	86.4	64.9	114.4	0.0	262	20	5.25	3.9
8806180000	4.76	61.3	7.7	78.3	32.1	26.4	42.3	145.6	0.0	337	23	4.45	3.5
8806190000	4.83	63.9	7.4	73.4	29.6	5.9	42.3	145.6	0.0	258	23	4.54	3.6
8806200000	4.89	69.2	8.4	72.9	29.6	6.0	50.8	141.4	0.0	221	23	3.98	3.7
8806210000	5.17	115.7	26.6	79.3	31.3	0.6	104.3	164.3	2.9	150	32	5.27	3.0
8806292100	3.80	71.3	7.2	188.6	59.3	260.7	56.4	457.6	0.0	2445	57	6.77	2.3
8806292300	3.97	56.6	6.7	140.7	50.2	196.4	50.8	299.5	0.0	1890	49	5.59	2.0
8806292400	4.03	53.5	6.4	134.7	51.0	185.7	50.8	274.6	0.0	1750	47	5.28	2.1
8806300700	4.61	42.2	3.1	79.3	32.9	28.2	39.5	147.7	0.0	500	31	4.31	2.5
8806300900	3.85	40.9	4.1	95.8	37.0	117.9	39.5	341.1	0.0	1500	44	4.32	2.0
8806301000	4.11	39.6	6.4	105.3	45.3	100.7	39.5	257.9	0.0	1015	47	4.8	1.9
8806301100	4.44	36.1	8.7	84.3	37.9	46.1	31.0	162.2	0.0	464	42	3.78	2.1
8807020900	4.79	42.6	1.8	48.4	18.9	1.4	36.7	95.7	0.0	203	20	2.3	3.5
8807040000	5.17	30.5	0.8	34.4	13.2	0.4	28.2	60.3	0.0	106	23	2.09	2.2
8807060000	5.50	35.7	1.5	40.9	18.9	0.1	33.8	52.0	6.4	59	17	2.06	2.6
8807080000	5.27	40.9	2.0	42.9	18.9	1.7	36.7	56.2	0.0	77	17	2.32	2.6
8807100000	5.39	35.7	1.3	31.9	11.5	0.3	33.8	43.7	4.1	59	17	1.54	2.7
8807160000	5.06	34.8	1.3	37.9	11.5	0.1	25.4	62.4	0.0	99	13	2.7	2.9
8807230000	5.65	24.8	0.8	25.4	9.1	1.0	22.6	31.2	0.0	51	20	1.46	1.7
8807300000	5.33	27.8	0.5	25.4	8.2	0.1	25.4	29.1	0.0	69	24	3.36	2.8
8808060000	5.35	27.8	1.0	21.0	7.4	0.1	25.4	20.8	2.9	69	27	3.23	2.6
8808121030	5.79	41.3	0.8	26.9	9.1	0.1	31.0	91.5	15.3	44	21	1.39	2.5
8808121230	4.17	44.8	2.3	128.2	35.4	103.2	31.0	224.6	0.0	615	21	1.46	2.2
8808121330	4.37	45.2	2.6	138.7	42.8	107.1	33.8	189.3	0.0	480	21	1.7	2.0
8808121430	4.64	40.0	2.0	98.8	32.1	70.4	28.2	126.9	0.0	298	14	1.53	1.9
8808121515	5.04	35.7	1.8	54.4	18.9	8.4	31.0	77.0	0.0	100	25	1.98	2.1
8808121516	4.82	36.1	2.0	74.4	24.7	42.5	28.2	101.9	0.0	183	14	1.48	1.9
8808122400	5.28	33.5	0.8	41.4	14.8	1.4	33.8	70.7	5.3	69	21	1.33	2.2
8808130915	5.40	32.6	0.5	34.4	12.3	0.2	31.0	43.7	7.6	56	17	1.08	2.4
8808140000	5.70	34.4	1.0	27.9	9.1	0.1	28.2	35.4	4.1	42	16	1.24	2.6
8808150000	5.04	27.8	1.5	33.4	11.5	0.4	22.6	54.1	0.0	85	25	3.3	2.1
8808160000	5.12	26.5	1.3	29.4	9.1	0.1	22.6	47.8	0.0	77	28	3.5	2.0
8808170000	5.13	28.7	1.3	29.9	9.1	0.1	22.6	43.7	0.0	81	28	3.53	2.1
8808180000	5.94	34.4	0.8	27.4	8.2	0.1	28.2	29.1	10.9	24	11	1.26	2.7
8808190000	5.04	29.6	1.5	30.4	9.1	2.4	25.4	43.7	0.0	90	28	3.44	2.2
8808200000	5.08	27.8	1.8	28.9	9.9	0.6	22.6	39.5	0.0	79	28	3.92	2.2
8808210000	5.14	25.7	1.5	25.0	8.2	0.4	19.7	33.3	0.0	79	28	3.62	2.0

File: SOG4-K88.WK1

8808220000	5.67	31.8	0.5	26.4	9.9	0.5	25.4	27.0	7.6	35	14	1.25	2.4
8808260000	5.29	27.0	1.3	23.5	8.2	0.1	25.4	22.9	0.0	70	28	4.09	2.2
8808270000	5.27	28.3	1.5	23.0	8.2	0.1	22.6	20.8	1.6	80	32	4.27	2.3
8809030000	5.45	27.4	1.8	19.0	6.6	0.1	22.6	20.8	0.0	71	32	4.47	2.2
8809050000	5.43	29.1	2.6	19.5	6.6	0.1	25.4	18.7	0.0	72	32	4.25	2.2
8809100000	5.52	33.1	3.1	22.0	7.4	1.1	36.7	25.0	5.3	66	30	4.48	1.2
8809170000	5.53	34.4	3.3	23.5	7.4	1.0	42.3	33.3	4.1	68	27	5.98	2.7
8809240000	5.86	28.7	0.8	25.4	7.4	0.7	22.6	22.9	8.7	38	19	1.32	2.3
8809290000	5.82	28.3	1.0	30.9	9.9	0.1	25.4	29.1	10.9	39	19	1.17	2.3
8809300000	5.85	24.4	0.5	23.5	7.4	0.2	22.6	22.9	8.7	35	17	1.24	2.2
8810010000	6.00	30.0	1.0	29.9	9.1	0.2	25.4	27.0	12.0	29	14	0.9	2.5
8810020000	5.84	30.0	0.8	27.4	8.2	0.3	25.4	27.0	6.4	31	14	0.89	2.7
8810040700	5.68	30.0	1.3	31.9	9.1	1.1	19.7	33.3	9.8	38	17	1.03	2.3
8810040900	4.98	40.5	1.0	119.8	30.5	36.8	22.6	164.3	0.0	218	17	1.44	2.4
8810041100	4.82	34.4	2.3	67.9	20.6	30.0	22.6	97.8	0.0	213	17	1.36	2.1
8810041300	4.75	38.7	4.6	83.3	29.6	52.9	25.4	99.8	0.0	205	24	1.97	2.0
8810041400	4.93	34.4	3.3	68.4	24.7	34.6	25.4	85.3	0.0	152	27	1.98	2.0
8810050000	5.67	28.3	0.5	29.4	9.1	0.4	25.4	41.6	6.4	30	13	1.07	2.6
8810060000	5.08	20.0	1.5	21.0	6.6	1.7	19.7	33.3	0.0	65	24	3.31	1.1
8810070000	5.71	28.7	0.5	27.4	8.2	0.2	22.6	35.4	6.4	30	13	1.03	2.8
8810080000	5.81	29.6	0.5	26.9	7.4	0.4	22.6	33.3	8.7	30	17	1.1	2.8
8810090000	5.23	20.9	1.3	22.5	6.6	1.3	19.7	25.0	1.6	561	27	3.3	1.2
8810100000	5.83	30.5	0.8	30.4	9.1	0.4	22.6	33.3	9.8	15	10	1.05	2.8
8810110000	5.17	19.1	1.0	20.0	5.8	0.8	16.9	22.9	0.0	57	24	2.99	1.2
8810120000	5.39	25.2	1.5	23.0	6.6	0.5	22.6	25.0	6.4	55	22	2.79	1.7
8810130000	5.72	29.1	1.0	30.9	7.4	0.5	19.7	25.0	24.0	22	11	1.35	2.5
8810140000	5.35	30.5	1.3	25.9	8.2	0.6	25.4	29.1	8.7	61	24	3.67	1.7
8810150000	5.24	29.6	1.8	26.4	8.2	0.4	25.4	29.1	7.6	73	28	4.44	1.5

SOG1 1989 runoff chemistry

Date/Time	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	ILAl	TOC	SiO2
8811040000	6.10	37.4	1.0	25.4	9.1	0.6	28.2	25.0	14	10	10	0.74	1.9
8811110000	5.98	31.3	0.8	25.9	9.1	0.4	22.6	25.0	17	10	10	0.87	2
8811180000	6.26	37.0	0.8	21.0	9.9	0.9	31.0	29.1	10	10	10	0.4	1.7
8811250000	5.87	38.3	1.0	21.0	9.1	0.9	31.0	25.0	16	10	10	0.61	1.8
8904140000	5.32	197.5	4.4	56.4	49.4	4.9	284.8	43.7	0	117	10	0.28	1.8
8904160000	5.20	224.0	4.4	43.9	51.8	3.0	313.0	35.4	0	113	10	0.45	1.3
8904180000	5.14	194.4	3.1	43.4	49.4	2.1	310.2	33.3	0	110	10	0.14	1.4
8904200000	5.27	197.9	8.2	45.9	50.2	1.9	315.8	33.3	0	102	10	0.43	1.5
8904220000	5.10	188.8	3.6	47.9	49.4	1.5	279.2	29.1	0	110	17	-99	-99
8904260000	5.33	150.1	3.3	45.4	40.3	2.4	228.4	27.0	4	83	10	0.15	2
8904280000	5.33	154.4	3.3	48.9	42.8	2.0	242.5	27.0	4	79	10	0.11	2
8904300000	5.34	156.6	4.4	51.9	45.3	1.9	242.5	22.9	6	81	10	0.33	1.9
8905020000	5.30	158.3	3.8	47.9	45.3	1.9	248.2	20.8	0	34	10	0.31	1.7
8905040000	5.24	139.6	3.1	35.4	37.0	1.1	205.9	25.0	0	77	10	0.24	1.4
8905060000	5.36	120.9	3.6	34.9	32.1	1.8	174.8	25.0	1	71	10	0.2	1.5
8905080000	5.35	116.1	3.1	36.9	31.3	2.3	166.4	27.0	1	41	10	0.34	1.6
8905120000	5.50	142.7	9.7	43.4	38.7	1.9	211.5	27.0	11	39	10	0.72	1.7
8905140000	5.32	117.9	2.8	37.9	32.9	1.6	177.7	25.0	3	32	10	0.36	1.6
8905160000	5.31	101.4	2.0	26.4	26.3	1.0	135.4	25.0	1	62	10	0.33	1.2
8905180000	5.50	105.7	3.8	27.9	27.2	1.1	149.5	29.1	7	42	10	0.52	1.3
8905200000	5.44	98.7	3.6	25.9	24.7	1.1	129.7	25.0	3	37	10	0.82	1.3
8905220000	5.39	88.7	2.6	24.0	22.2	0.9	115.6	22.9	3	25	10	0.43	1.1
8905240000	5.40	74.8	1.5	20.5	18.9	0.6	93.1	25.0	2	27	10	0.39	1
8905260000	5.41	61.8	1.5	18.0	15.6	1.1	76.1	25.0	6	25	10	0.38	0.9
8905280000	5.45	61.8	1.5	18.0	15.6	1.0	73.3	22.9	6	18	10	0.39	0.9
8905300000	5.44	59.2	1.5	18.5	14.8	1.1	67.7	22.9	6	20	10	0.38	1
8906010000	6.11	58.3	3.6	19.0	14.0	1.0	73.3	22.9	10	15	10	0.55	1.1
8906040000	5.52	55.7	1.8	18.5	14.0	0.9	70.5	22.9	8	18	10	0.53	1.1
8906070000	5.23	48.7	1.0	14.0	11.5	0.4	56.4	22.9	4	15	10	0.41	1
8906100000	5.37	38.3	0.8	11.5	9.1	0.6	42.3	18.7	3	17	10	0.49	0.8
8906130000	5.58	37.4	1.0	12.5	9.1	0.2	39.5	18.7	2	10	10	0.59	1
8906140000	5.93	22.2	1.0	5.5	4.9	0.4	22.6	10.4	1	10	10	0.85	0.4
8906160000	5.71	33.9	1.3	12.0	8.2	0.1	31.0	20.8	1	10	10	0.43	0.8
8906190000	5.76	33.9	1.0	11.5	8.2	0.2	31.0	18.7	2	10	10	0.38	0.8
8906220000	5.77	40.5	2.8	11.5	7.4	0.1	39.5	20.8	11	12	10	0.63	0.8
8906250000	5.92	32.2	1.0	11.0	5.8	0.1	28.2	22.9	9	12	10	0.5	0.8
8906270000	5.75	33.1	1.0	10.5	8.2	0.2	28.2	22.9	6	12	10	0.41	0.8
8907050000	5.88	33.9	1.3	12.0	8.2	0.3	28.2	22.9	9	10	10	0.44	1
8907110000	5.71	34.4	1.5	11.5	7.4	0.1	28.2	25.0	5	10	10	0.5	0.9
8907170000	5.81	37.4	1.3	12.0	7.4	0.1	31.0	25.0	9	10	10	0.73	0.9
8907230000	5.90	38.3	1.5	13.5	7.4	0.1	31.0	25.0	10	10	10	0.63	0.9
8907300000	5.61	40.0	1.8	13.0	8.2	0.1	33.8	25.0	1	10	10	1.25	1
8908060000	6.03	43.1	3.3	13.5	8.2	0.3	36.7	27.0	9	12	10	0.95	1
8908130000	5.92	47.4	2.8	14.0	8.2	0.4	33.8	20.8	0	10	10	0.95	0.9
8908200000	5.73	42.2	2.0	14.5	9.1	0.3	33.8	25.0	2	10	10	0.83	1
8908220000	5.84	41.3	1.5	14.5	9.1	0.4	31.0	22.9	2	10	10	0.69	1.1
8908270000	5.90	42.6	1.5	15.5	9.1	0.3	33.8	25.0	3	10	10	0.67	1.1
8909030000	5.87	45.7	2.8	16.5	9.9	0.2	39.5	27.0	4	10	10	1.04	1.2
8909090000	5.88	44.4	1.8	15.5	10.7	0.2	39.5	29.1	5	10	10	0.85	1.2
8909170000	5.92	45.2	1.8	20.0	10.7	0.1	36.7	29.1	4	10	10	0.68	1.2
8909240000	5.84	43.1	1.8	18.0	10.7	0.6	39.5	33.3	9	10	10	0.63	1.3
8909300000	5.81	45.2	1.5	19.0	10.7	0.4	36.7	31.2	6	10	10	0.66	1.4
8910080000	6.45	47.0	1.8	23.5	11.5	0.4	36.7	35.4	8	10	10	0.58	1.5
8910150000	6.00	43.9	2.0	24.0	11.5	0.4	39.5	29.1	3	10	10	0.66	1.5
8910210000	6.10	39.2	1.3	20.0	11.5	0.8	36.7	22.9	4	10	10	0.37	1.6
8910270000	6.25	42.6	1.3	20.0	10.7	0.5	36.7	39.5	5	10	10	0.55	1.6

SOG2 1989 runoff chemistry Units: ueq/l, ug Al/l, mgC/l, mg SiO2/l

Date/Time	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	ILAl	TOC	SiO2
8811040000	5.53	34.4	0.8	38.4	14.0	0.9	28.2	52.0	0	15	10	0.84	2.6
8811110000	5.78	34.8	2.3	41.9	14.0	1.1	33.8	54.1	10	13	10	1.18	2.6
8811180000	5.58	37.0	1.0	39.9	17.3	0.6	31.0	56.2	5	54	23	0.85	2.4
8811250000	5.49	35.7	0.5	41.9	18.1	0.7	28.2	58.2	10	68	23	1.07	2.5
8904140000	4.51	100.1	3.6	50.9	35.4	7.1	132.5	203.8	0	460	21	0.57	1.7
8904160000	4.48	96.1	1.8	34.9	28.8	6.0	124.1	112.3	0	258	10	0.47	1.3
8904180000	4.66	83.1	1.3	36.4	25.5	4.3	121.3	95.7	0	174	10	0.5	1.8
8904200000	4.93	80.5	4.9	37.4	23.9	3.6	110.0	79.0	0	147	10	0.54	1.8
8904220000	4.86	80.5	2.0	38.9	24.7	3.9	101.5	70.7	0	205	10	-99	-99
8904260000	5.41	76.6	2.8	43.4	23.9	3.6	101.5	60.3	0	106	10	3.36	2.7
8904280000	5.11	73.5	2.8	43.4	23.0	3.4	98.7	60.3	0	83	10	0.57	2.8
8904300000	5.14	70.5	2.6	43.9	23.9	3.9	93.1	56.2	0	85	10	4.35	2.7
8905020000	5.03	64.8	2.0	34.4	20.6	4.6	81.8	54.1	0	130	10	0.57	1.8
8905040000	4.93	62.2	2.3	27.9	18.9	2.9	76.1	54.1	0	139	10	0.77	1.6
8905060000	5.12	63.9	2.6	32.4	19.8	2.3	79.0	49.9	0	85	10	1.94	1.9
8905080000	4.98	70.0	3.6	30.9	19.8	3.2	87.4	47.8	0	81	10	1.7	1.8
8905120000	5.23	57.9	2.3	34.4	18.9	2.1	73.3	47.8	0	54	10	0.45	2.1
8905140000	5.10	54.4	2.0	27.9	16.5	3.5	70.5	43.7	0	64	10	1.47	1.6
8905160000	5.16	38.7	1.5	20.5	11.5	1.1	42.3	39.5	0	79	14	0.79	1
8905180000	5.16	42.6	1.0	23.0	13.2	1.5	47.9	39.5	0	46	10	0.36	1.4
8905200000	5.46	42.2	1.8	22.5	12.3	1.5	45.1	37.4	0	68	14	1.2	1.3
8905220000	5.25	38.3	1.5	21.0	11.5	1.2	39.5	35.4	1	60	10	0.52	1.1
8905240000	5.18	33.5	0.8	20.5	10.7	0.7	33.8	35.4	0	68	10	1	1.2
8905260000	5.19	30.0	1.0	19.5	9.9	1.6	28.2	35.4	2	60	10	0.56	1
8905280000	5.24	30.5	1.0	18.0	9.1	1.2	31.0	31.2	3	55	10	0.46	1
8905300000	5.26	31.8	1.0	20.0	9.9	1.1	31.0	35.4	4	44	10	0.51	1.3
8906010000	5.53	34.4	0.8	23.5	11.5	0.9	36.7	39.5	7	46	10	0.57	1.6
8906040000	5.30	27.8	0.8	18.5	8.2	0.6	25.4	31.2	5	55	10	0.88	1.2
8906070000	5.24	21.3	0.5	13.5	6.6	0.6	19.7	25.0	0	42	10	0.51	0.9
8906100000	5.26	17.8	0.5	11.0	5.8	0.5	16.9	20.8	3	33	10	0.54	0.8
8906130000	5.39	16.1	0.5	10.0	4.9	0.2	14.1	18.7	0	23	10	0.65	0.7
8906140000	5.47	15.7	1.0	8.5	4.1	0.6	14.1	18.7	0	28	10	0.82	0.5
8906160000	5.45	14.8	0.8	10.0	4.9	0.2	31.0	16.6	0	18	10	0.44	0.6
8906190000	5.54	12.6	0.5	9.0	4.1	0.1	11.3	14.6	0	13	10	0.36	0.5
8906220000	5.54	13.9	0.8	10.0	3.3	0.1	14.1	16.6	6	15	10	0.51	0.5
8906250000	5.71	15.2	0.5	11.5	3.3	0.1	14.1	18.7	7	15	10	0.54	0.7
8906270000	5.64	15.7	0.5	12.0	5.8	0.1	16.9	18.7	3	15	10	0.53	0.8
8907050000	5.67	20.9	0.5	16.0	7.4	0.2	16.9	27.0	3	12	10	0.89	1.3
8907110000	5.53	23.9	0.5	18.5	7.4	0.4	22.6	31.2	2	10	10	1.37	1.4
8907150800	5.42	25.2	0.5	16.5	7.4	0.3	22.6	29.1	3	22	10	1.29	1.3
8907150930	4.87	24.8	0.5	17.0	7.4	0.3	22.6	43.7	0	25	10	1.05	1.3
8907151300	4.69	26.1	0.5	20.0	9.1	0.3	22.6	62.4	0	77	10	1.07	1.4
8907160700	4.90	27.4	0.5	22.0	9.9	0.2	25.4	62.4	0	92	10	1.08	1.4
8907170000	5.04	29.6	0.8	24.5	10.7	0.1	25.4	62.4	0	77	10	1.29	1.4
8907180000	5.06	30.0	1.3	24.5	10.7	0.1	25.4	58.2	0	77	11	1.6	1.4
8907190000	5.18	31.8	1.8	24.5	10.7	0.3	25.4	58.2	0	66	11	1.38	1.6
8907200000	5.18	32.2	1.5	25.9	10.7	0.1	28.2	58.2	0	68	10	1.41	1.6
8907210000	5.18	31.3	0.8	25.9	10.7	0.1	25.4	58.2	0	69	10	1.37	1.5
8907220000	5.21	32.2	0.5	28.4	11.5	0.2	28.2	58.2	0	53	10	1.27	1.5
8907230000	5.19	31.8	0.5	27.9	11.5	0.1	25.4	60.3	0	58	10	1.3	1.5
8907240000	5.21	32.2	0.5	28.9	11.5	0.1	25.4	56.2	0	55	10	1.18	1.5
8907300000	5.25	33.5	1.0	26.4	11.5	0.3	33.8	54.1	0	39	10	1.33	1.6
8908060000	5.37	35.7	1.8	25.0	11.5	0.1	31.0	54.1	0	56	10	1.19	1.6
8908130000	5.28	32.6	0.8	24.5	10.7	0.3	22.6	45.8	0	42	10	1	1.6
8908200000	5.30	33.5	0.8	23.5	11.5	0.6	28.2	47.8	0	42	10	1	1.7
8908221150	5.33	30.0	1.0	24.0	9.9	1.0	22.6	41.6	0	49	10	1.05	1.7
8908221615	5.21	30.0	0.8	23.5	10.7	1.1	22.6	43.7	0	64	10	1.07	1.6
8908221815	5.16	30.5	1.0	25.0	10.7	1.1	22.6	49.9	0	73	10	1.17	1.6
8908231015	5.01	30.5	1.0	29.4	13.2	0.7	22.6	64.5	0	112	13	1.05	1.7

8908231220	5.01	30.9	1.3	32.4	14.8	0.6	25.4	66.6	0	116	13	1.16	1.7
8908231400	4.96	30.9	1.3	32.9	14.8	0.6	25.4	79.0	0	130	13	1.17	1.7
8908231615	4.91	32.2	1.3	36.9	16.5	0.6	25.4	93.6	0	158	17	1.12	1.7
8908231815	4.86	32.2	1.3	36.4	16.5	0.6	25.4	95.7	0	211	13	1.1	1.7
8908232110	4.85	32.2	1.3	39.4	17.3	0.3	25.4	106.1	0	211	13	1.11	1.7
8908240910	4.88	33.1	1.5	38.9	17.3	0.4	25.4	104.0	0	227	13	1.06	1.7
8908250000	4.93	33.1	1.3	37.4	17.3	0.2	22.6	91.5	0	192	17	-99	1.8
8908260000	4.91	33.5	1.0	37.4	17.3	0.5	25.4	91.5	0	186	14	1.21	1.8
8908270000	5.09	41.8	3.6	38.4	17.3	0.2	33.8	85.3	0	150	14	1.22	1.8
8908280000	5.06	34.4	1.3	38.9	16.5	0.1	25.4	85.3	0	20	14	1.01	1.8
8908290000	5.11	34.4	1.3	38.4	16.5	0.2	28.2	87.4	0	150	30	1.06	2
8908300000	5.11	36.1	1.5	38.4	16.5	0.1	28.2	85.3	0	144	30	0.98	2
8908310000	5.10	35.7	1.3	37.9	16.5	0.1	28.2	87.4	0	136	27	0.96	1.9
8909010000	5.07	34.8	1.0	38.4	16.5	0.1	28.2	87.4	0	136	32	1.03	2.1
8909020000	5.11	34.8	1.0	37.9	17.3	0.2	28.2	81.1	0	115	10	0.95	1.9
8909030000	5.12	34.8	1.3	37.9	17.3	0.2	28.2	81.1	0	103	10	0.93	1.9
8909090000	5.16	37.8	1.5	34.4	17.3	0.2	31.0	77.0	0	92	10	0.82	1.9
8909151830	5.19	37.4	1.3	33.9	15.6	0.6	31.0	70.7	0	73	10	0.8	2
8909152100	5.12	37.4	1.3	34.9	15.6	0.6	31.0	72.8	0	83	10	0.74	2
8909152200	4.96	37.4	1.5	34.4	15.6	0.6	31.0	79.0	0	99	10	0.81	2
8909161000	4.99	37.4	1.5	35.4	15.6	0.6	31.0	85.3	0	124	10	0.83	2
8909170000	5.01	39.2	1.3	38.4	17.3	0.5	33.8	81.1	0	120	10	0.8	2.1
8909180000	5.00	39.2	1.3	37.4	17.3	0.6	33.8	81.1	0	122	14	0.53	2.1
8909190000	5.05	36.5	1.3	35.9	15.6	0.9	31.0	77.0	0	104	14	0.86	1.9
8909200000	5.31	37.0	1.3	34.4	14.8	0.9	33.8	77.0	0	106	10	0.89	2
8909210000	5.12	35.7	1.3	31.4	14.8	0.7	31.0	74.9	0	95	10	0.72	2
8909220000	5.99	46.5	3.6	46.4	18.1	1.3	39.5	74.9	0	79	52	0.89	2.6
8909230000	5.26	42.2	3.1	32.4	14.8	0.9	42.3	74.9	0	81	20	0.89	2
8909240000	5.17	36.1	1.5	31.9	14.8	1.5	31.0	70.7	0	87	10	0.72	2
8909250000	5.85	45.7	3.6	44.9	15.6	1.9	39.5	72.8	0	66	39	1	2.6
8909300000	5.10	38.7	1.0	35.9	16.5	1.0	33.8	81.1	0	111	10	0.47	2.2
8910010000	5.11	39.6	1.5	36.4	16.5	1.1	33.8	85.3	0	121	10	0.76	2.1
8910020000	5.14	39.6	1.5	37.4	16.5	1.1	33.8	81.1	0	101	10	0.88	2.2
8910030000	5.15	40.0	1.5	36.9	16.5	1.0	33.8	79.0	0	105	10	0.81	2.2
8910040000	5.39	42.6	1.5	37.4	17.3	1.1	36.7	72.8	0	75	10	0.65	2.2
8910050000	5.22	42.2	1.3	38.4	17.3	1.1	36.7	68.6	0	79	10	0.72	2.2
8910060000	5.23	41.8	1.3	38.4	16.5	1.0	36.7	72.8	0	79	10	0.65	2.2
8910070000	5.29	42.2	1.5	38.4	16.5	0.9	36.7	72.8	0	74	10	0.7	2.2
8910080000	5.21	41.3	1.3	38.4	16.5	1.4	36.7	70.7	0	76	10	0.73	2.2
8910090000	5.25	41.3	1.8	37.9	16.5	1.4	42.3	79.0	0	70	10	0.72	2.3
8910100000	5.29	39.6	1.3	38.4	16.5	1.4	39.5	77.0	0	68	10	0.75	2.3
8910110000	5.98	54.4	4.4	56.4	20.6	2.1	53.6	77.0	0	45	20	0.88	3.1
8910150000	5.42	39.6	1.8	37.9	16.5	1.9	39.5	64.5	0	36	10	0.69	2.3
8910210000	5.35	37.8	1.0	36.9	14.8	2.1	36.7	60.3	0	48	10	0.76	2.3
8910270000	5.47	32.6	0.8	29.4	13.2	2.0	31.0	52.0	0	46	10	0.61	2.1

'7. SOG3 1989 runoff chemistry Units: ueq/l, ug Al/l, mgC/l, mg SiO2/l

Date/Time	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	IlAl	TOC	SiO2
8811040000	5.93	36.5	0.5	24.5	9.9	0.4	22.6	22.9	19	10	10	0.55	2.2
8811110000	6.03	30.5	0.5	25.9	9.9	0.4	19.7	22.9	23	10	10	0.52	2.1
8811180000	6.50	34.4	0.5	21.5	9.1	0.4	25.4	31.2	12	10	10	0.51	1.9
8811250000	5.85	34.8	0.5	22.0	9.1	0.3	22.6	25.0	15	10	10	0.58	2.1
8905220000	5.47	74.8	1.8	20.0	18.9	0.6	93.1	29.1	1	25	10	0.34	1
8905240000	5.44	57.9	1.3	15.5	14.0	0.4	64.9	22.9	0	20	10	0.37	0.8
8905260000	5.44	51.3	1.0	15.0	13.2	1.3	56.4	25.0	5	20	10	0.32	0.7
8905280000	5.52	58.3	1.5	16.0	14.0	0.9	67.7	25.0	5	18	10	0.34	0.9
8905300000	5.53	60.0	1.5	17.5	14.8	0.5	67.7	25.0	6	18	10	0.34	1.1
8906010000	5.61	60.9	1.5	18.5	14.8	0.4	79.0	27.0	7	15	10	0.4	1.2
8906040000	5.50	45.2	1.3	13.5	10.7	0.4	47.9	22.9	6	18	10	0.54	0.8
8906070000	5.50	40.0	1.0	11.0	9.1	0.4	42.3	20.8	5	10	10	0.32	0.8
8906100000	5.52	33.9	0.8	9.0	8.2	0.3	33.8	18.7	3	10	10	0.41	0.7
8906130000	5.61	33.9	1.0	8.5	8.2	0.1	31.0	18.7	0	10	10	0.46	0.8
8906140000	5.48	35.7	1.8	9.0	8.2	0.1	33.8	20.8	0	10	10	1.13	0.8
8906160000	5.59	31.8	1.0	9.0	7.4	0.1	11.3	16.6	0	12	10	0.33	0.7
8906190000	5.70	27.8	1.0	8.0	6.6	0.1	22.6	16.6	0	10	10	0.49	0.6
8906220000	5.62	29.1	1.5	8.5	4.9	0.1	25.4	18.7	7	10	10	0.39	0.6
8906250000	5.73	30.9	1.0	9.0	4.9	0.1	28.2	22.9	7	12	10	0.38	0.8
8906270000	5.75	27.8	0.8	9.0	7.4	0.1	22.6	20.8	6	10	10	0.43	0.8
8907050000	5.70	27.4	0.8	8.5	7.4	0.1	19.7	20.8	4	10	10	0.34	0.9
8907110000	5.78	27.8	0.8	9.0	5.8	0.1	19.7	18.7	5	10	10	0.35	0.9
8907170000	5.72	34.4	0.8	11.0	6.6	0.1	25.4	22.9	9	10	10	0.46	1.1
8907230000	5.86	36.5	0.8	13.0	7.4	0.1	28.2	22.9	6	10	10	0.6	1.2
8907300000	5.99	36.5	0.8	12.5	7.4	0.2	28.2	20.8	5	10	10	0.58	1.3
8908060000	6.00	42.2	1.0	12.5	7.4	0.2	31.0	22.9	9	10	10	0.55	1.4
8908130000	6.03	41.8	1.3	15.0	7.4	0.2	31.0	20.8	3	10	10	0.74	1.5
8908200000	5.99	40.9	0.8	16.5	9.1	0.2	33.8	20.8	6	10	10	0.71	1.6
8908220000	5.97	37.0	1.0	15.5	8.2	0.1	28.2	20.8	4	10	10	0.59	1.6
8908270000	6.01	41.3	1.3	15.5	8.2	0.1	31.0	20.8	8	10	10	0.66	1.6
8909030000	5.07	54.8	3.6	14.0	9.9	0.2	47.9	25.0	9	10	10	1.15	1.6
8909090000	5.98	47.4	1.5	17.5	10.7	0.2	42.3	22.9	11	10	10	0.64	1.6
8909170000	6.01	44.4	1.5	20.0	10.7	0.1	39.5	25.0	7	10	10	0.54	1.8
8909240000	5.84	39.6	1.8	18.0	9.9	1.1	36.7	27.0	8	10	10	0.63	1.7
8909300000	5.89	46.1	1.8	18.5	10.7	0.1	39.5	25.0	6	10	10	0.86	1.8
8910080000	6.10	46.5	1.3	22.0	10.7	0.6	42.3	25.0	55	10	10	0.45	1.9
8910150000	5.94	38.3	1.0	20.5	11.5	0.6	39.5	18.7	1	10	10	0.44	1.6
8910210000	5.95	39.6	1.0	19.5	10.7	0.6	39.5	20.8	0	10	10	0.52	1.6
8910270000	5.90	35.2	1.0	16.5	9.9	0.4	36.7	20.8	2	10	10	0.43	1.5

SOG4 1989 runoff chemistry Units: ueq/l, ug Al/l, mgC/l, mg SiO2/l

Date/Time	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	ILAl	TOC	SiO2
8904140000	4.28	72.2	3.1	49.4	27.2	43.6	90.2	116.5	0	262	14	0.78	1.4
8904160000	4.75	62.6	1.5	31.4	17.3	10.9	79.0	54.1	0	112	10	0.72	1.7
8904180000	4.97	60.9	1.3	31.4	15.6	7.0	81.8	52.0	0	70	10	0.83	2
8904200000	5.15	58.7	0.8	30.4	14.8	4.9	76.1	43.7	0	63	10	0.31	1.9
8904220000	5.26	57.0	1.8	30.9	14.0	4.3	70.5	37.4	0	44	10	-99	-99
8904260000	5.48	54.4	1.5	31.9	13.2	3.1	64.9	35.4	3	37	10	1.59	2.6
8904280000	5.40	52.6	1.3	31.9	13.2	2.9	64.9	33.3	2	46	10	0.8	2.6
8904300000	5.40	53.1	1.8	33.9	14.0	4.0	62.0	35.4	4	30	10	2.33	2.4
8905020000	5.15	43.9	1.5	25.0	12.3	3.2	50.8	35.4	0	69	11	0.76	1.3
8905040000	5.23	44.8	1.5	28.4	12.3	2.0	50.8	33.3	4	56	10	0.76	1.9
8905060000	5.39	47.0	1.5	28.9	12.3	2.1	56.4	31.2	3	43	10	1.26	2.1
8905080000	5.23	22.6	1.5	28.4	14.0	2.4	64.9	31.2	0	41	10	1.42	1.8
8905120000	5.51	43.1	1.3	29.9	12.3	1.6	50.8	33.3	3	28	10	0.45	2
8905140000	5.26	33.1	1.0	22.5	9.9	2.9	45.1	31.2	0	33	10	0.57	1.3
8905160000	5.25	32.2	0.8	21.0	9.9	1.2	36.7	31.2	0	45	10	0.63	1.3
8905180000	5.32	33.9	0.8	21.5	9.1	0.9	33.8	31.2	0	30	10	0.33	1.4
8905200000	5.37	34.4	0.8	23.0	9.9	0.9	33.8	27.0	0	42	10	0.71	1.6
8905220000	5.37	28.3	0.5	18.0	8.2	0.7	28.2	20.8	1	30	10	0.77	1
8905240000	5.27	25.7	0.8	17.5	7.4	0.6	25.4	25.0	1	30	10	1.02	0.9
8905260000	5.34	24.8	0.5	17.0	6.6	0.7	22.6	22.9	6	20	10	0.51	0.9
8905280000	5.48	27.4	0.8	18.5	7.4	0.6	25.4	22.9	7	20	10	1	1.3
8905300000	5.51	29.6	0.5	18.5	7.4	0.7	28.2	22.9	7	20	10	0.62	1.3
8906010000	5.53	30.5	0.8	22.0	8.2	0.8	28.2	27.0	10	18	10	0.61	1.6
8906040000	5.44	20.9	0.5	15.0	6.6	0.4	19.7	18.7	8	20	10	0.62	0.9
8906070000	5.46	17.4	0.5	12.0	4.9	0.6	16.9	16.6	5	13	10	0.48	0.8
8906100000	5.51	15.2	0.5	10.5	4.1	0.2	14.1	12.5	3	13	10	0.55	0.8
8906130000	5.55	13.1	0.5	8.0	3.3	0.2	11.3	10.4	0	17	10	0.75	0.5
8906140000	5.69	32.2	0.8	11.5	8.2	0.1	33.8	14.6	2	10	10	0.51	0.6
8906160000	5.61	12.6	0.5	7.0	2.5	0.1	11.3	8.3	0	15	10	0.56	0.5
8906190000	5.68	21.3	1.3	14.5	4.9	0.1	19.7	16.6	0	33	14	1.99	1.6
8906220000	5.39	17.0	2.0	6.5	2.5	0.1	14.1	8.3	7	31	14	4.62	0.6
8906270000	5.55	34.8	2.0	15.0	6.6	0.5	31.0	22.9	6	44	16	2.23	2
8907050000	5.51	31.8	3.3	7.5	4.9	0.2	16.9	12.5	7	55	29	5.6	1
8907151800	5.28	54.8	2.0	27.9	9.1	2.1	56.4	31.2	11	37	13	3.61	2.5
8907152000	5.17	65.3	4.1	68.9	24.7	27.5	53.6	95.7	0	94	22	3.37	2.1
8907160700	5.42	41.3	1.5	36.4	13.2	1.3	39.5	52.0	4	57	19	1.83	2.1
8907170000	5.49	45.7	1.8	31.9	10.7	0.6	39.5	47.8	5	60	19	2.14	2.5
8907180000	5.62	38.3	1.3	25.0	8.2	0.3	33.8	31.2	7	46	17	1.77	2.3
8907190000	5.63	37.0	1.5	26.4	8.2	0.1	31.0	33.3	10	31	19	1.55	2.3
8907200000	5.66	47.9	3.8	28.9	9.1	0.3	45.1	33.3	9	24	16	2.27	2.6
8907210000	5.76	45.2	1.3	25.9	8.2	0.4	39.5	29.1	7	20	16	1.95	2.2
8907220000	5.37	47.4	2.6	19.0	9.9	0.1	28.2	41.6	2	55	22	3.92	1.8
8907230000	5.65	50.0	1.8	26.9	8.2	0.2	45.1	29.1	5	24	11	2.19	1.7
8907240000	5.35	51.3	3.3	17.5	9.1	0.1	31.0	39.5	0	46	19	4.22	1.4
8907300000	5.62	47.0	1.0	28.4	8.2	0.9	50.8	31.2	1	35	19	2.96	1.8
8908060000	5.98	43.5	1.5	20.5	6.6	0.1	45.1	20.8	13	25	13	1.77	2.9
8908130000	5.54	30.9	0.5	14.5	7.4	0.1	19.7	18.7	0	69	39	3.58	2
8908200000	5.93	31.3	1.0	27.4	8.2	0.2	28.2	22.9	9	33	17	1.55	2.2
8908231530	5.82	32.2	0.8	24.0	6.6	0.1	25.4	27.0	0	35	17	1.3	2.2
8908231800	4.72	41.3	2.0	92.3	28.0	86.8	25.4	91.5	0	250	21	1.84	1.6
8908231900	4.41	42.6	4.1	127.2	47.7	110.7	25.4	189.3	0	485	21	1.52	1.5
8908240600	5.26	30.9	1.0	34.9	12.3	1.9	22.6	52.0	0	65	19	1.19	2.1
8908240700	4.30	37.4	1.5	88.3	29.6	86.8	25.4	162.2	0	505	19	1.19	1.8
8908240810	4.09	45.2	4.9	109.8	46.1	107.1	25.4	214.2	0	620	21	1.27	1.6
8908241000	4.19	38.7	5.1	101.8	43.6	101.1	25.4	174.7	0	436	21	1.37	1.7
8908250000	3.79	41.8	2.3	98.8	45.3	150.0	28.2	249.6	0	790	21	-99	1.1
8908260000	4.84	34.4	1.3	43.4	18.1	15.4	25.4	87.4	0	184	17	1.42	1.9
8908270000	5.45	35.7	1.0	25.4	8.2	0.4	28.2	35.4	0	40	14	1.51	2.2
8908280000	4.55	44.4	1.5	84.3	38.7	38.6	28.2	181.0	0	484	24	2.14	1.6

8908290000	5.69	37.0	1.3	24.5	8.2	0.4	31.0	33.3	4	29	14	1.48	2.3
8908300000	5.05	38.7	1.0	42.4	18.1	5.2	31.0	81.1	0	140	59	1.9	2
8908310000	5.30	38.7	1.5	32.9	13.2	0.6	33.8	58.2	0	60	21	1.86	2
8909010000	5.72	43.9	8.2	23.0	7.4	0.4	31.0	29.1	4	32	14	1.49	2.1
8909020000	4.95	39.2	1.3	47.4	23.9	0.3	33.8	95.7	0	157	27	2.56	1.6
8909030000	5.53	36.5	0.5	22.0	8.2	0.4	31.0	29.1	0	32	14	1.68	2.5
8909090000	5.86	45.2	0.8	26.4	10.7	0.5	42.3	27.0	8	22	11	1.14	2.5
8909150000	5.72	35.2	0.8	27.4	9.9	0.5	36.7	27.0	0	40	14	1.91	1.9
8909151300	3.92	55.7	8.7	183.1	66.7	203.6	39.5	341.1	0	1375	35	2.52	1.7
8909151400	4.25	50.5	8.7	125.7	50.2	101.4	39.5	222.6	0	580	22	2.77	1.7
8909151530	4.55	39.6	4.9	54.4	25.5	22.9	42.3	104.0	0	178	17	-99	1.8
8909161000	5.27	30.9	1.0	28.4	10.7	0.9	28.2	45.8	0	54	14	1.62	2
8909170000	4.39	47.0	2.8	72.4	32.9	56.4	42.3	149.8	0	439	20	2.28	1.5
8909180000	5.54	35.7	1.0	27.4	9.9	0.5	31.0	39.5	0	33	11	1.32	2.6
8909190000	4.60	37.4	2.3	48.4	21.4	18.2	36.7	99.8	0	220	24	2.17	1.3
8909200000	5.49	28.7	1.3	25.4	9.1	1.1	25.4	41.6	3	47	14	1.47	1.6
8909210000	4.75	33.1	2.3	32.9	16.5	4.9	36.7	77.0	0	128	22	2.21	1
8909220000	6.22	42.2	2.6	41.9	13.2	0.6	36.7	43.7	47	31	16	1.08	2.9
8909230000	5.53	33.1	0.5	26.4	9.1	0.3	31.0	43.7	4	38	11	1.19	2.3
8909240000	4.83	33.5	2.3	33.4	14.8	4.7	36.7	74.9	0	135	35	2.73	1.3
8909250000	6.23	45.7	3.6	47.9	12.3	1.6	39.5	41.6	54	27	11	1.43	3.1
8909300000	4.53	49.6	4.6	54.9	25.5	32.1	45.1	118.6	0	347	26	2.86	1.5
8910010000	5.52	37.0	1.0	26.9	9.1	0.3	31.0	41.6	0	27	10	1.04	2.7
8910020000	5.00	43.5	2.8	36.4	15.6	9.8	39.5	70.7	0	141	18	2.42	2
8910030000	5.62	41.3	1.5	27.9	9.9	0.4	36.7	35.4	2	20	10	1	2.5
8910040000	4.90	50.0	2.8	44.9	19.8	10.1	50.8	79.0	0	167	41	2.09	1.8
8910050000	5.38	39.2	1.5	29.4	10.7	1.9	36.7	43.7	0	38	20	1.93	2.3
8910060000	4.83	55.7	32.8	51.4	23.0	9.4	59.2	93.6	0	221	54	2.6	1.7
8910070000	4.90	50.9	2.6	47.4	21.4	8.1	53.6	87.4	0	206	37	2.44	1.8
8910080000	4.92	48.3	2.3	43.4	18.9	6.0	53.6	79.0	0	182	43	2.33	2
8910090000	5.42	37.4	1.3	30.9	10.7	1.0	45.1	45.8	0	21	11	1.08	2.7
8910100000	4.94	48.7	2.8	44.4	20.6	3.9	62.0	85.3	0	198	53	2.35	1.9
8910110000	5.61	64.4	5.6	62.9	23.9	4.4	76.1	85.3	7	127	92	2.53	2.8
8910150000	5.76	24.8	0.3	23.0	8.2	0.7	25.4	22.9	0	15	10	0.93	1.5
8910210000	5.63	29.6	1.3	23.0	8.2	1.0	31.0	22.9	0	22	10	1.24	1.5
8910270000	5.75	32.2	0.5	27.4	9.9	0.2	33.8	35.4	0	22	10	0.94	2.3

Sogndal runoff chemistry 1Units: ueq/l, ug Al/l, mgC/l, mg SiO2/l
(-99 = missing data)
SOG 1

Year	Date	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	LAl	TOC	SiO2	totN
1989	1111	5.83	45.2	1.3	18.5	9.9	0.6	39.5	27.1	5.3	10	0	0.37	1.5	-99
1989	1118	5.66	47.9	1.3	19.5	10.7	0.7	42.3	31.2	17.5	10	0	0.35	1.8	-99
1989	1111	5.83	-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	0.0	-99	-99	-99	-99	-99
1990	207	5.73	62.2	3.1	31.9	15.6	1.7	59.2	41.6	28.2	10	0	0.45	2.2	-99
1990	408	5.26	128.8	3.8	37.9	34.6	2.4	174.9	56.2	6.4	71	61	0.3	1.7	-99
1990	415	5.32	114.4	4.1	39.4	32.1	2.6	152.3	47.9	6.4	45	35	0.26	1.8	-99
1990	420	5.39	108.3	3.8	37.9	31.3	2.5	152.3	43.7	6.4	50	40	0.41	1.9	-99
1990	423	5.50	106.6	4.1	37.4	30.4	3.0	146.7	37.5	5.3	27	17	0.31	2	-99
1990	425	5.38	129.6	4.9	36.9	35.4	4.1	189.0	31.2	0.0	35	25	0.71	1.5	-99
1990	426	5.36	124.0	3.8	35.9	33.7	3.4	174.9	35.4	2.9	23	13	0.4	1.6	-99
1990	429	5.24	126.6	3.6	36.4	34.6	4.9	183.4	37.5	0.0	58	48	0.41	1.5	-99
1990	502	5.23	111.8	3.1	25.0	28.0	3.7	152.3	29.2	0.0	58	48	0.47	1.1	-99
1990	505	5.27	110.5	2.8	24.5	27.2	2.0	160.8	27.1	0.0	55	45	0.32	1	-99
1990	508	6.32	94.4	2.0	21.0	23.9	1.8	135.4	29.2	4.1	68	58	0.43	1	-99
1990	511	5.72	82.7	2.0	18.5	20.6	1.4	115.7	25.0	0.0	44	34	0.6	0.8	-99
1990	514	5.55	70.9	1.8	16.5	17.3	1.1	98.7	20.8	0.0	39	29	0.53	0.9	32
1990	517	5.45	59.6	1.3	16.0	14.8	1.1	79.0	18.7	0.0	25	15	0.48	0.8	29
1990	520	5.50	57.9	1.3	16.5	14.0	0.9	76.2	16.7	0.0	28	18	0.39	0.9	23
1990	523	5.61	56.6	1.5	16.0	14.0	0.6	73.4	16.7	0.0	27	17	0.46	1	23
1990	526	5.59	54.4	1.5	16.5	13.2	0.6	67.7	14.6	0.0	20	10	0.39	1	23
1990	529	5.74	56.1	1.5	19.5	13.2	0.7	67.7	20.8	1.6	20	10	0.47	1.1	36
1990	601	5.85	49.6	1.5	15.5	11.5	0.4	59.2	18.7	0.0	15	5	0.55	0.9	30
1990	604	5.66	42.6	1.5	13.5	9.9	0.8	48.0	20.8	0.0	15	5	0.35	0.7	36
1990	607	5.71	39.2	1.5	12.5	9.0	0.6	42.3	20.8	0.0	10	0	0.43	0.8	32
1990	608	6.41	37.0	1.5	11.5	7.4	0.6	36.7	20.8	0.0	15	5	0.47	0.7	39
1990	610	5.96	37.4	1.5	11.5	7.4	0.3	36.7	18.7	0.0	13	3	0.44	0.7	21
1990	615	5.81	33.1	1.3	10.0	7.4	0.1	33.9	16.7	0.0	10	0	0.44	0.8	33
1990	616	5.72	35.2	1.8	10.5	6.6	0.3	33.9	18.7	0.0	10	0	0.45	0.8	63
1990	622	5.23	33.5	1.3	10.0	7.4	0.7	28.2	18.7	2.9	10	0	0.41	0.8	42
1990	630	5.75	32.6	1.3	8.5	5.8	0.2	28.2	18.7	4.1	10	0	0.38	0.8	42
1990	707	6.05	32.6	1.3	11.0	7.4	0.2	25.4	18.7	0.0	10	0	0.63	0.8	36
1990	713	5.07	33.5	1.0	10.5	6.6	0.4	28.2	20.8	0.0	10	0	0.592	0.8	36
1990	719	5.82	36.5	1.5	14.5	6.6	0.2	31.0	25.0	0.0	10	0	0.91	0.9	84
1990	723	5.77	36.1	1.5	12.5	7.4	0.1	31.0	25.0	4.1	10	0	0.61	0.9	60
1990	724	5.82	37.0	1.5	12.5	6.6	0.1	31.0	25.0	0.0	10	0	0.67	0.9	54
1990	726	6.30	37.4	1.8	12.5	7.4	0.1	31.0	20.8	6.4	10	0	0.67	1	63
1990	728	6.29	39.6	1.8	13.0	7.4	0.1	31.0	22.9	0.0	10	0	0.98	0.9	89
1990	730	6.06	37.9	1.5	12.0	7.4	0.4	31.0	22.9	0.0	10	0	0.74	0.9	83
1990	804	6.12	62.6	10.2	14.0	8.2	0.3	53.6	22.9	5.3	10	0	1.36	0.9	357
1990	808	5.89	40.5	2.0	13.0	8.2	0.5	31.0	25.0	0.0	10	0	0.76	0.9	78
1990	810	5.76	41.3	1.8	13.0	8.2	0.2	31.0	25.0	0.0	10	0	0.81	1	60
1990	812	5.83	40.9	2.0	13.0	9.0	0.1	31.0	25.0	0.0	10	0	0.67	0.9	57
1990	817	5.76	40.9	2.0	12.0	8.2	0.2	31.0	29.2	0.0	10	0	0.67	1	81
1990	824	6.06	42.2	1.8	13.0	8.2	0.1	33.9	27.1	0.0	10	0	0.2	1.1	84
1990	831	5.82	41.3	1.5	15.0	8.2	0.2	33.9	27.1	2.9	10	0	0.67	1.4	5
1990	907	5.96	43.9	1.8	17.0	9.0	0.4	25.4	27.1	2.9	10	0	0.68	1.5	75
1990	914	5.85	45.7	2.0	18.5	8.2	0.1	36.7	29.2	0.0	10	0	0.99	1.4	108
1990	920	5.82	43.5	1.5	18.0	8.2	0.1	33.9	27.1	2.9	10	0	0.9	1.4	48
1990	927	5.94	44.8	1.8	18.0	10.7	0.1	33.9	22.9	7.6	24	14	0.89	1.4	113
1990	1005	6.02	42.2	1.3	18.0	9.9	0.1	33.9	27.1	0.0	10	0	0.42	1.4	504
1990	1014	5.75	42.6	1.0	17.5	9.9	0.6	33.9	25.0	6.0	10	0	0.36	1.4	69
1990	1019	5.91	43.5	1.3	19.0	9.9	0.2	36.7	22.9	7.0	10	0	0.39	1.3	45
1990	1026	5.96	46.1	1.5	19.0	10.7	0.3	39.5	27.1	6.0	10	0	0.32	1.6	26
1990	1102	6.08	46.1	1.3	21.5	10.7	0.1	36.7	27.1	5.0	10	0	0.99	1.5	36

Year	Date	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	LAl	TOC	SiO2	totN
SOG 2															
1989	1104	5.25	43.06	1.02	32.44	14.81	2.21	42.31	45.80	0.01	58	48	0.47	2.2	-99
1989	1111	5.36	41.76	2.30	29.44	11.52	2.86	39.49	43.72	0.01	46	36	1.16	2.2	-99
1989	1118	5.5	104.00	12.27	39.42	17.27	5.86	104.40	62.46	27.16	18	8	1.87	2.7	-99
1990	207	4.79	118.80	3.32	23.95	32.08	15.35	152.30	58.30	0.01	95	85	1.01	1	-99
1990	415	4.78	78.74	5.11	47.41	24.68	1.14	90.27	93.69	0.01	88	78	1.34	2.6	-99
1990	420	4.39	93.96	4.86	43.91	27.97	5.50	124.10	141.60	0.00	305	295	0.73	2.6	-99
1990	423	4.29	97.00	3.58	40.42	29.61	15.35	129.80	131.20	0.00	303	293	0.68	2	-99
1990	425	4.64	76.13	2.05	36.43	23.86	9.07	98.74	81.20	0.01	160	150	0.68	1.9	-99
1990	426	4.66	74.39	2.81	32.93	23.03	8.28	98.74	79.12	0.01	170	160	0.74	1.5	-99
1990	429	4.65	78.30	3.07	33.93	23.03	10.07	101.60	70.79	0.01	154	144	0.75	1.8	-99
1990	502	4.91	53.51	2.30	22.95	15.63	3.64	64.88	47.89	0.01	89	79	0.72	1.1	-99
1990	505	4.99	47.42	1.53	22.95	14.81	2.64	62.06	45.80	0.01	83	73	1.65	1.2	-99
1990	508	5.08	44.81	1.79	22.45	13.16	1.57	56.42	39.56	0.01	73	63	0.66	1.1	-99
1990	511	5.04	40.46	1.53	19.96	12.34	1.21	47.96	39.56	0.01	65	55	0.74	1.1	-99
1990	514	5.11	36.98	1.02	17.96	10.69	1.21	42.31	33.31	0.01	67	57	0.62	1.1	38
1990	517	5.21	32.19	0.77	17.96	9.05	1.36	36.67	27.07	0.01	62	52	0.67	1.1	45
1990	520	5.25	31.32	1.02	17.96	8.23	1.57	36.67	24.98	0.01	63	53	0.51	1.2	69
1990	523	5.28	32.19	1.28	20.46	9.87	1.07	36.67	29.15	0.01	46	36	0.73	1.3	57
1990	526	5.33	32.19	1.28	21.96	9.87	1.29	36.67	29.15	0.01	46	36	0.61	1.5	51
1990	529	5.3	28.27	1.28	18.46	7.40	1.00	28.21	29.15	0.01	54	44	0.58	1.1	60
1990	601	5.92	23.05	1.02	15.47	6.58	0.93	22.57	22.90	0.01	18	8	0.52	0.9	60
1990	604	5.3	17.83	0.77	12.48	4.94	1.36	16.93	20.82	0.01	23	13	0.42	0.6	42
1990	607	5.44	18.27	2.81	11.48	4.94	1.21	16.93	18.74	0.01	26	16	0.78	0.7	113
1990	608	5.46	12.61	0.77	6.99	2.47	1.07	11.28	10.41	0.01	13	3	0.41	0.4	183
1990	610	5.42	14.36	0.77	9.48	3.29	0.50	11.28	16.66	0.01	15	5	0.44	0.6	51
1990	615	5.62	9.57	0.51	6.49	2.47	0.29	8.46	8.33	0.01	10	0	0.53	0.4	27
1990	616	5.63	9.57	0.51	6.49	2.47	0.36	8.46	10.41	0.01	10	0	0.47	0.5	39
1990	622	5.21	14.79	1.28	9.48	4.11	1.57	14.10	12.49	1.65	12	2	0.61	0.6	120
1990	630	5.61	17.40	0.51	12.97	4.94	0.36	14.10	16.66	0.01	10	0	1.23	0.8	89
1990	707	5.72	20.01	0.51	15.47	5.76	0.64	16.93	20.82	0.01	15	5	1.25	1.1	102
1990	713	5.63	22.18	0.51	15.97	6.58	0.79	19.75	27.07	0.01	10	0	1.08	1.2	108
1990	719	5.65	25.66	0.51	19.96	7.40	0.57	25.39	33.31	0.01	12	2	1.56	1.3	257
1990	720	5.42	26.53	0.51	18.96	8.23	1.00	25.39	31.23	0.01	17	7	1.61	1.4	233
1990	721	4.85	28.71	0.51	22.95	9.05	0.79	25.39	56.21	0.01	49	39	1.59	1.5	185
1990	722	5.14	28.27	0.51	23.45	9.05	1.07	25.39	49.97	0.01	34	24	1.63	1.4	185
1990	723	5.19	29.15	0.51	25.45	9.87	0.71	25.39	49.97	0.01	32	22	1.51	1.4	170
1990	724	5.16	29.58	0.51	25.45	9.05	0.79	25.39	49.97	0.01	43	33	1.8	1.5	176
1990	725	5.28	30.01	0.51	26.45	9.87	0.86	25.39	47.89	0.01	35	25	1.58	1.5	164
1990	726	5.32	31.76	0.51	26.45	9.87	0.57	28.21	49.97	0.01	25	15	1.7	1.5	173
1990	727	5.31	31.32	0.51	26.45	9.87	0.36	28.21	47.89	0.01	29	19	1.67	1.5	167
1990	728	5.29	33.49	0.77	27.45	10.69	0.36	28.21	49.97	0.01	19	9	1.73	1.5	185
1990	729	5.36	32.19	0.51	26.45	10.69	0.36	28.21	47.89	0.01	24	14	1.54	1.5	179
1990	730	5.18	32.19	0.51	25.45	10.69	2.00	28.21	54.13	0.01	42	32	1.64	1.5	191
1990	731	5.17	31.76	0.51	25.45	10.69	2.36	28.21	52.05	0.01	42	32	1.56	1.5	197
1990	804	5.62	43.94	6.39	27.94	11.52	1.71	36.67	49.97	0.01	26	16	1.8	1.5	375
1990	808	5.15	33.93	0.51	24.45	10.69	1.79	28.21	49.97	0.01	59	49	1.14	1.5	137
1990	810	5.27	39.59	2.56	25.45	11.52	1.50	33.85	47.89	0.01	53	43	1.4	1.5	212
1990	811	5.14	35.24	1.02	25.45	10.69	2.21	28.21	52.05	0.01	61	51	1.22	1.5	146
1990	817	5.24	32.63	0.77	22.95	9.87	0.86	25.39	47.89	0.01	37	27	1.08	1.6	122
1990	824	5.37	34.37	0.77	25.95	9.87	0.43	31.03	45.80	0.01	20	10	1.02	1.8	102

Year	Date	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	LAl	TOC	SiO2	totN
1990	831	5.39	34.37	0.77	26.95	10.69	0.79	31.03	45.80	0.01	22	12	0.95	2	104
1990	905	4.64	34.37	1.28	36.93	13.98	1.00	31.03	91.61	0.00	126	116	1.15	1.9	108
1990	906	4.66	34.37	1.28	37.92	14.81	1.14	28.21	95.77	0.01	172	162	1.08	2	120
1990	907	4.88	37.41	1.28	39.42	14.81	0.93	31.03	81.20	0.01	187	177	0.97	2.2	111
1990	908	4.88	37.41	1.28	39.42	14.81	0.93	31.03	83.28	0.01	189	179	1.01	2.2	99
1990	909	4.92	37.41	1.28	39.92	14.81	0.93	31.03	83.28	0.00	138	128	0.98	2.3	87
1990	910	4.96	38.28	1.28	40.42	14.81	1.00	31.03	85.36	0.00	165	155	1	2.3	99
1990	912	4.96	38.28	1.28	37.92	13.16	1.07	31.03	81.20	0.01	134	124	0.91	2.1	102
1990	913	4.96	37.85	1.28	38.42	13.16	1.07	31.03	79.12	0.01	144	134	0.94	2.1	102
1990	914	5.32	54.38	5.37	40.42	14.81	2.07	47.96	77.03	0.01	76	66	1.94	2.2	437
1990	915	5.99	54.81	5.37	51.90	15.63	2.07	47.96	74.95	5.00	34	14	2.26	2.6	257
1990	920	5.16	37.85	1.02	34.93	12.34	1.43	33.85	62.46	0.01	96	86	1.12	2.1	90
1990	927	5.01	39.15	1.02	38.92	16.45	2.43	33.85	70.79	0.01	138	128	0.75	2.2	95
1990	928	5.03	39.59	1.28	37.92	16.45	2.43	33.85	68.71	0.01	148	138	0.84	2.2	95
1990	929	5.06	36.10	1.02	34.93	14.81	2.93	31.03	62.46	0.01	138	128	0.85	2	95
1990	930	5.65	42.63	2.81	42.42	16.45	2.57	36.67	62.46	0.01	58	48	1.09	2.4	143
1990	1001	5.18	35.67	1.02	35.93	13.98	2.21	31.03	62.46	0.01	127	117	0.79	2.1	80
1990	1002	5.74	41.33	2.30	45.41	16.45	2.64	33.85	66.62	0.01	67	57	0.84	1.8	92
1990	1003	5.25	35.24	0.77	33.93	14.81	2.29	31.03	64.54	0.01	93	83	0.55	2.1	89
1990	1004	5.47	40.89	1.79	38.92	16.45	2.36	33.85	64.54	0.01	79	55	0.99	2.4	89
1990	1005	5.27	34.80	1.02	32.93	13.98	2.43	28.21	60.38	0.01	75	65	0.59	2	95
1990	1012	5.59	38.28	0.77	31.94	14.81	2.57	33.85	52.05	0.01	65	55	0.46	2.2	90
1990	1014	5.16	36.11	0.77	25.95	11.52	2.64	31.03	45.80	0.00	83	73	0.47	1.5	80
1990	1015	5.5	51.33	7.42	40.42	15.63	2.86	36.67	62.46	6.00	87	44	2.83	2.2	132
1990	1016	5.17	36.98	0.77	32.93	13.98	2.50	33.85	62.46	0.00	81	71	0.65	2	80
1990	1017	5.46	41.76	2.05	40.92	15.63	2.64	39.49	58.30	2.91	79	36	1.59	2.3	150
1990	1018	5.23	36.54	0.77	33.43	13.98	2.78	33.85	56.21	0.00	78	68	0.57	1.8	92
1990	1019	5.25	36.98	0.77	32.93	13.16	2.50	33.85	56.21	0.00	76	66	0.55	1.9	92
1990	1020	5.76	43.07	1.79	43.41	15.63	2.78	36.67	54.13	9.00	68	30	0.62	2.3	86
1990	1021	5.25	41.33	1.28	36.93	14.81	3.07	36.67	64.54	0.00	71	61	0.53	2.2	134
1990	1022	5.76	48.29	2.56	45.91	17.27	3.43	42.32	62.46	22.00	55	25	0.94	2.5	144
1990	1026	5.22	42.20	1.02	37.43	15.63	3.57	39.49	64.54	0.00	67	57	0.59	2.3	129
1990	1102	5.33	46.11	1.53	41.42	15.63	3.28	42.32	66.62	0.00	58	48	1.3	2.3	425

SOG 3

1989	1104	5.74	37.85	0.51	16.97	9.87	0.29	36.67	20.82	1.65	10	0	0.31	1.5	-99
1989	1111	5.87	41.33	0.77	19.96	10.69	0.21	36.67	22.90	7.58	10	0	0.35	1.9	-99
1989	1118	5.81	47.42	1.02	24.45	12.34	0.43	45.14	31.23	14.24	10	0	0.42	2.1	-99
1990	207	5.18	96.14	3.07	23.45	26.32	7.71	129.80	35.39	0.01	54	44	0.65	1	-99
1990	514	5.49	60.90	1.53	15.47	14.81	1.07	78.99	27.07	0.01	32	22	0.45	0.8	23
1990	517	5.5	59.60	1.53	14.97	13.98	0.79	76.17	18.74	0.01	23	13	0.55	0.8	23
1990	520	5.52	60.47	1.53	15.47	13.98	0.93	76.17	18.74	0.01	27	17	0.41	0.9	23
1990	523	5.49	62.20	1.79	16.97	14.81	0.79	78.99	20.82	0.01	23	13	0.53	1	23
1990	526	5.5	60.90	1.79	17.47	14.81	0.86	76.17	20.82	0.01	25	15	0.35	1.1	24
1990	529	5.53	50.02	1.53	13.47	11.52	0.79	56.42	20.82	0.01	25	15	0.42	0.8	30
1990	601	5.64	47.85	1.53	12.48	10.69	0.64	53.60	18.74	0.01	15	5	0.56	0.9	24
1990	604	5.52	36.98	1.28	11.98	8.23	0.07	36.67	18.74	0.01	15	5	1.13	0.7	72
1990	607	5.61	34.37	1.53	9.48	6.58	0.64	31.03	18.74	0.01	10	0	0.32	0.6	27
1990	608	5.6	30.88	1.28	8.48	5.76	0.50	28.21	16.66	0.01	10	0	0.42	0.6	21
1990	610	5.65	30.45	1.28	8.98	4.94	0.79	28.21	16.66	0.01	10	0	0.38	0.6	21
1990	615	5.68	22.18	1.02	6.99	4.11	0.07	19.75	14.57	0.01	10	0	0.51	0.6	21
1990	616	5.7	25.23	0.77	7.49	4.94	0.07	22.57	14.57	0.01	10	0	0.44	0.7	21
1990	622	5.68	26.97	1.02	8.98	7.40	0.79	22.57	18.74	0.01	10	0	0.45	0.8	57
1990	630	5.8	26.97	0.77	8.98	7.40	0.21	19.75	16.66	0.01	10	0	0.52	0.8	36
1990	707	5.85	28.71	1.02	9.98	6.58	0.07	22.57	20.82	0.01	10	0	0.61	0.9	18

Year	Date	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	LAl	TOC	SiO2	totN
1990	713	5.92	30.88	1.02	10.48	6.58	0.21	25.39	20.82	0.01	10	0	0.515	1	24
1990	719	5.9	36.54	1.28	10.98	6.58	0.21	28.21	22.90	0.01	10	0	0.99	1.2	108
1990	723	5.83	39.15	0.51	12.48	7.40	0.21	28.21	24.98	0.01	10	0	0.95	1.1	66
1990	724	5.8	40.02	0.51	12.48	7.40	0.36	28.21	24.98	0.01	10	0	0.85	1.2	72
1990	726	6.06	41.76	0.77	13.47	8.23	0.50	31.03	24.98	2.91	10	0	0.92	1.2	89
1990	728	5.94	42.63	0.77	13.47	8.23	0.79	31.03	24.98	1.65	10	0	0.95	1.1	89
1990	730	5.75	43.50	1.02	12.97	8.23	1.29	31.03	29.15	0.01	10	0	1.05	1.1	113
1990	804	5.74	46.11	1.28	13.47	8.23	0.50	33.85	27.07	0.01	10	0	1.05	1.1	87
1990	808	5.91	43.06	0.54	13.97	8.23	0.29	31.03	22.90	4.12	10	0	0.82	1.3	60
1990	810	5.88	43.50	1.02	12.97	7.40	0.29	31.03	22.90	1.65	10	0	0.75	1.3	54
1990	812	5.97	47.42	1.02	15.97	9.05	0.07	33.85	20.82	4.12	10	0	0.91	1.4	57
1990	817	6	39.15	0.77	13.97	8.23	0.14	31.03	22.90	0.01	10	0	0.72	1.5	45
1990	824	5.97	46.11	0.77	15.97	7.40	0.14	39.49	22.90	7.58	10	0	0.3	1.6	54
1990	831	5.94	45.67	1.28	17.47	9.05	0.64	36.67	22.90	9.83	10	0	0.73	1.8	56
1990	907	6.07	46.11	1.53	19.46	9.87	0.29	36.67	20.82	13.14	10	0	0.78	1.9	51
1990	914	6.27	49.59	1.79	19.46	9.05	0.29	42.32	20.82	9.00	10	0	1.13	1.7	48
1990	920	5.99	39.59	1.53	17.96	8.23	0.21	33.85	16.66	6.45	10	0	0.82	1.6	30
1990	927	6.12	45.24	1.28	18.46	11.52	0.21	39.49	18.74	4.12	10	0	0.64	1.8	71
1990	1005	6.02	39.15	1.28	16.47	9.87	0.29	33.85	22.90	0.01	10	0	0.37	1.5	42
1990	1014	5.65	38.28	0.77	16.97	9.87	1.14	33.85	22.90	3.00	10	0	0.48	1.4	39
1990	1019	5.92	41.33	1.28	16.97	9.87	0.07	36.67	20.82	5.00	10	0	0.38	1.6	29
1990	1026	5.9	46.98	0.77	18.96	12.34	0.71	45.14	27.07	6.00	10	0	0.32	1.9	39
1990	1102	5.95	44.37	0.77	19.96	10.69	0.64	36.67	22.90	4.00	10	0	0.47	1.8	36
SOG 4															
1989	1104	5.66	30.45	0.77	23.95	8.23	0.21	28.21	24.98	12.04	102	92	1.27	2	-99
1989	1111	5.14	34.80	2.81	21.46	9.87	0.50	39.49	31.23	4.12	183	61	4.19	1.4	-99
1990	207	4.9	68.73	2.56	20.46	18.10	9.00	84.63	43.72	0.01	64	54	1.45	1.6	-99
1990	330	5.63	60.47	3.84	33.93	15.63	1.50	67.70	33.31	12.04	32	15	0.97	2.8	-99
1990	408	4.86	59.60	3.32	38.42	16.45	16.07	67.70	60.38	0.01	104	94	1.17	2.5	-99
1990	415	5.27	83.95	11.76	39.92	16.45	11.00	90.27	49.97	10.94	25	15	4.17	2.8	-99
1990	420	5.18	61.77	5.88	35.93	15.63	7.78	73.35	52.05	0.01	54	37	3.85	2.5	-99
1990	423	4.87	60.90	2.81	33.93	16.45	16.78	73.35	54.13	0.01	105	92	1.56	2	-99
1990	426	4.91	56.11	2.30	29.94	15.63	10.85	67.70	45.80	0.01	91	81	0.88	1.6	-99
1990	429	4.93	54.38	2.30	26.95	14.81	12.28	67.70	41.64	0.01	91	81	0.74	1.5	-99
1990	502	5.1	40.89	2.30	17.96	10.69	5.43	45.14	29.15	0.01	60	50	1.05	0.9	-99
1990	505	5.2	45.24	1.79	23.95	12.34	4.71	53.60	37.48	0.01	50	40	1.56	1.5	-99
1990	508	5.1	38.72	3.07	15.47	8.23	3.36	42.31	29.15	0.01	60	50	1.03	0.8	-99
1990	511	5.14	30.88	1.02	15.47	8.23	2.07	33.85	24.98	0.01	46	36	0.76	1	-99
1990	514	5.25	27.84	1.02	14.97	7.40	1.43	31.03	22.90	0.01	39	29	0.86	0.9	98
1990	517	5.36	27.84	1.02	17.47	7.40	1.36	28.21	20.82	0.01	39	29	0.65	1	53
1990	520	5.43	26.97	0.77	16.47	6.58	1.29	28.21	14.57	0.01	32	22	0.75	1	51
1990	523	5.49	30.01	1.02	20.46	7.40	1.07	31.03	20.82	0.01	30	20	0.85	1.3	51
1990	526	5.7	32.19	1.28	22.45	8.23	1.21	33.85	20.82	0.01	27	17	0.71	1.7	57
1990	529	5.5	21.32	0.77	13.47	4.94	0.64	19.75	16.66	0.01	27	17	0.61	0.8	42
1990	601	5.57	19.14	1.02	13.47	4.94	0.50	16.93	12.49	0.01	18	8	0.78	0.7	114
1990	604	5.57	16.97	1.02	12.97	4.11	0.86	14.10	12.49	0.01	20	10	1.32	0.6	299
1990	607	5.51	17.40	1.28	13.47	4.94	1.21	14.10	16.66	0.01	16	6	1.68	0.8	348
1990	608	5.43	19.14	3.84	7.49	2.47	0.21	14.10	10.41	6.45	39	19	2.37	0.7	194
1990	610	5.44	17.40	1.02	12.97	3.29	0.07	14.10	12.49	2.91	20	10	2.05	0.9	465
1990	616	5.79	21.32	1.28	14.47	4.94	0.43	19.75	14.57	0.01	23	13	1.46	1.3	159
1990	622	5.47	45.67	2.56	17.96	12.34	1.07	36.67	35.39	5.29	69	39	4.28	2.3	417
1990	630	5.47	36.98	0.77	14.97	7.40	0.14	19.75	24.98	0.01	57	27	3.84	2	218
1990	707	5.55	35.67	0.77	15.97	7.40	0.29	19.75	20.82	5.29	62	32	3.12	1.9	176
1990	713	5.75	34.80	0.51	22.45	7.40	0.50	33.85	31.23	0.01	20	10	1.29	2	114

Year	Date	pH	Na	K	Ca	Mg	NO3	Cl	SO4	ALK-X	RAl	LAl	TOC	SiO2	totN
1990	719	5.68	46.98	2.05	15.47	6.58	0.14	45.14	16.66	0.01	58	23	4.25	1.1	369
1990	721	4.56	94.83	2.05	216.60	65.81	178.50	67.70	202.00	0.01	410	399	5.55	1.5	4600
1990	722	5.07	47.85	0.51	56.89	18.10	4.78	45.14	91.61	0.01	75	65	1.99	2.3	299
1990	723	5.73	50.02	1.28	44.41	12.34	0.21	47.96	47.89	1.65	26	16	1.9	2.4	170
1990	724	6.31	59.16	1.28	99.80	23.03	0.36	50.78	83.28	33.54	51	15	2.78	2.5	218
1990	725	5.53	51.33	1.79	38.42	11.52	0.07	53.60	49.97	0.01	29	19	2.18	2.2	212
1990	804	5.58	65.25	6.39	39.92	13.98	0.07	67.70	52.05	0.01	26	16	4.21	1.1	315
1990	808	5.18	42.19	0.51	31.44	13.16	0.14	33.85	47.89	0.01	71	44	3.79	2	189
1990	810	5.26	44.81	1.02	33.43	13.98	0.07	36.67	47.89	0.01	85	52	3.39	2	212
1990	811	5.83	44.37	0.77	16.97	9.05	0.14	42.31	33.31	12.04	36	25	2.05	2	170
1990	817	5.28	31.76	0.51	22.95	9.05	0.14	25.39	33.31	0.01	6.6	-23.4	3.78	1.4	215
1990	824	5.51	39.15	1.02	26.95	9.87	0.14	39.49	24.98	7.58	105	25	4.59	1.6	407
1990	831	5.44	33.93	0.77	24.95	9.87	0.36	36.67	20.82	6.45	151	37	5.11	1.6	501
1990	905	5.29	33.93	0.51	30.44	9.05	0.36	33.85	39.56	15.33	45	31	1.5	2.4	147
1990	906	5.8	36.54	0.77	35.43	10.69	0.36	33.85	29.15	10.94	25	15	1	2.6	126
1990	907	5.33	32.63	1.53	29.94	10.69	0.71	31.03	33.31	2.91	280	64	8.21	1.4	770
1990	908	5.48	36.98	1.53	29.44	9.87	0.71	33.85	31.23	4.12	162	24	4.91	1.9	491
1990	909	5.91	43.94	1.53	27.45	7.40	1.36	39.49	31.23	4.00	36	22	2.02	2.6	176
1990	910	5.33	34.80	1.53	27.94	10.69	0.57	33.85	31.23	5.00	269	223	7.87	1.6	776
1990	912	5.33	38.28	2.56	26.95	10.69	0.57	39.49	24.98	7.58	343	39	9.23	1.3	950
1990	913	5.61	43.94	1.79	26.45	7.40	1.14	42.31	22.90	8.71	89	19	3.08	2.2	473
1990	914	5.5	40.02	2.30	25.45	9.87	0.64	45.14	22.90	9.00	377	49	10.7	1.3	915
1990	915	5.98	50.90	5.11	41.92	12.34	1.14	53.60	24.98	35.00	336	26	11.3	2.1	915
1990	920	5.34	29.58	2.30	17.96	7.40	0.43	33.85	14.57	0.01	222	42	7.01	1	572
1990	927	5.04	38.28	3.84	30.94	13.98	15.35	39.49	35.39	0.01	410	140	11.1	1.5	1100
1990	928	5.55	36.54	1.02	29.44	9.87	1.71	31.03	39.56	0.01	46	35	0.82	2.2	92
1990	929	5.2	26.53	3.84	18.96	9.87	4.21	28.21	24.98	0.01	272	73	7.29	1	677
1990	930	6.04	45.24	3.58	36.93	12.34	0.93	39.49	37.48	21.82	41	18	1.34	2.5	126
1990	1001	5.51	33.06	2.05	23.95	9.05	1.64	31.03	27.07	0.01	169	38	3.25	2.5	384
1990	1002	5.98	41.76	3.58	36.93	11.52	1.71	36.67	33.31	13.14	115	16	2.48	2.5	296
1990	1003	5.75	36.98	1.28	26.45	9.05	0.29	33.85	27.07	0.01	29	18	0.78	2.2	42
1990	1004	5.63	33.49	3.84	26.95	10.69	2.14	33.85	24.98	1.65	205	36	6.17	1.5	633
1990	1005	5.43	25.66	2.56	16.47	8.23	1.43	28.21	16.66	0.01	250	45	7.43	0.9	677
1990	1014	3.8	39.59	2.56	79.34	32.90	178.50	33.85	212.36	-99.00	940	920	2.48	0.4	3030
1990	1015	5.46	44.37	2.05	37.43	13.16	8.21	36.67	62.46	3.00	52	33	2.29	2.1	231
1990	1016	4.02	45.68	2.81	111.78	41.95	189.21	36.67	241.51	-99.00	1255	1231	2.65	0.4	3310
1990	1017	5.62	42.19	1.79	36.43	11.52	2.93	36.67	45.80	6.45	41	22	1.26	2.5	120
1990	1018	4.23	42.20	2.81	99.30	37.84	124.95	33.85	185.30	-99.00	885	866	2.14	0.6	3010
1990	1019	4.54	42.20	2.56	89.82	34.55	74.97	36.67	187.38	-99.00	610	583	2.57	0.5	1740
1990	1020	5.96	45.68	2.30	42.91	12.34	1.86	33.85	41.64	28.00	36	23	0.75	2.6	84
1990	1021	4.73	53.94	3.32	103.29	42.78	52.84	47.96	233.18	0.00	655	618	6.11	1	2410
1990	1022	4.96	61.77	5.11	109.28	42.78	46.77	53.60	210.28	0.00	441	398	4.23	1.6	1890
1990	1026	4.76	68.30	3.84	110.28	47.71	34.99	62.06	274.82	0.00	540	499	4.82	1.4	2310
1990	1102	4.92	63.95	6.39	49.90	32.90	0.86	62.06	197.79	3.00	203	161	4.21	1.2	1950

APPENDIX 5

Appendix 5. Sogndal. Input-output budgets

Sogndal yearly volume-weighted fluxes and concentrations
27-Mar 91

sog1 out fluxes Units: meq/m2/yr

	1984	1985	1986	1987	1988	1989	1990	avg
mm	1026	828	857	790	767	1677	1449	991
h	2	2	1	1	2	2	3	2
na	90	29	28	30	29	68	62	46
k	11	2	2	3	1	2	2	3
ca	21	13	15	16	16	20	20	17
mg	15	7	7	8	9	17	15	10
al	1	0	0	0	0	2	0	1
nh4	6	4	0	0	0	0	0	2
no3	2	1	1	1	1	1	1	1
cl	91	24	24	30	28	87	72	47
so4	29	18	23	16	20	22	29	21
hco3	15	11	3	10	7	4	5	8
SBC	137	51	52	57	55	107	99	76
SSA	122	43	48	47	49	110	101	70
c-alk	15	8	4	10	6	-4	-2	7

sog2 out fluxes

	1984	1985	1986	1987	1988	1989	1990	avg
mm	1086	891	925	683	750	1292	997	938
h	9	4	7	5	6	14	8	8
na	64	28	32	26	25	64	45	40
k	4	2	2	4	1	2	2	3
ca	24	20	26	20	24	38	23	25
mg	14	10	13	9	11	22	13	13
al	3	2	2	2	1	16	5	4
nh4	3	0	0	0	0	0	0	1
no3	4	1	1	2	2	3	3	2
cl	65	23	31	25	25	75	51	41
so4	43	34	53	34	44	94	44	50
hco3	5	2	0	5	1	1	1	2
SBC	106	60	73	59	61	126	84	81
SSA	112	58	85	61	71	172	98	93
c-alk	-6	2	-12	-2	-10	-46	-14	-12

sog3 out fluxes

	1984	1985	1986	1987	1988	1989	1990	avg
mm	1026	828	857	790	767	1677	1449	1056
h	4	1	1	2	1	4	3	2
na	80	27	26	30	23	78	62	46
k	2	1	0	1	1	2	2	1
ca	21	13	15	15	13	23	18	17
mg	19	7	7	8	7	19	15	12
al	0	0	0	1	0	1	2	1
nh4	1	0	0	0	0	0	0	0
no3	2	0	0	0	0	1	2	1
cl	85	21	23	29	20	87	71	48
so4	25	18	20	18	17	35	28	23
hco3	1	4	3	6	7	6	11	6
SBC	122	48	48	54	44	121	96	76
SSA	112	39	43	47	37	123	101	72
c-alk	10	9	5	7	7	-1	-4	5

sog4 out fluxes

	1984	1985	1986	1987	1988	1989	1990	avg
mm	1086	891	930	718	710	1250	983	938
h	4	4	6	3	4	20	15	8
na	55	37	27	27	21	74	47	41
k	2	1	2	2	1	3	2	2
ca	28	18	25	19	20	52	32	28
mg	13	8	10	8	8	23	15	12
al	1	0	1	2	0	12	5	3
nh4	1	1	0	0	0	0	0	0
no3	4	1	6	2	4	16	19	8
cl	62	23	24	25	20	83	51	41
so4	28	21	42	26	26	80	41	38
hco3	7	6	1	1	3	6	2	4
SBC	98	64	64	56	50	152	97	83
SSA	94	45	72	53	50	179	112	86
c-alk	4	19	-8	3	0	-27	-15	-4

Sogndal yearly volume-weighted concentrations

sog1 concentrations Units: ueq/l

	1983 pre	1984	1985	1986	1987	1988	1989	1990	avg
mm									
pH	6	5.7	5.6	5.9	5.9	5.6	5.9	5.7	5.8
h	1	1.9	2.4	1.2	1.3	2.6	1.4	1.8	1.7
na	38	87.7	35.0	32.7	38.0	37.8	40.3	42.9	46.0
k	0	10.7	2.4	2.3	3.8	1.3	1.2	1.4	3.5
ca	19	20.5	15.7	17.5	20.3	20.9	12.1	13.6	17.0
mg	9	14.6	8.5	8.2	10.1	11.7	10.0	10.2	10.6
al	0	1.0	0.0	0.0	0.0	0.0	1.3	0.1	0.5
nh4	0	5.8	4.8	0.0	0.0	0.0	0.0	0.0	1.7
no3	3	1.9	1.2	1.2	1.3	1.3	0.6	0.7	1.2
cl	34	88.7	29.0	28.0	38.0	36.5	52.0	49.4	47.8
so4	22	28.3	21.7	26.8	20.3	26.1	13.3	19.7	21.6
hco3	9	14.6	13.3	3.5	12.7	9.1	2.3	3.3	8.4
SBC*	28.3	35.1	29.4	29.6	30.0	31.2	5.9	13.3	24.1
SBC	66.0	133.5	61.6	60.7	72.2	71.7	63.6	68.2	77.1
SSA	59.0	118.9	51.9	56.0	59.5	63.9	65.9	69.8	70.6
c-alk	7.0	14.6	9.7	4.7	12.7	7.8	-2.3	-1.6	6.6

sog2 concentrations

	1983 pre	1984	1985	1986	1987	1988	1989	1990	avg
mm									
pH	5.5	5.1	5.3	5.1	5.1	5.1	5.0	5.1	5.1
h	3	8.3	4.5	7.6	7.3	8.0	11.0	7.5	7.6
na	53	58.9	31.4	34.6	38.1	33.3	49.6	45.5	40.2
k	3	3.7	2.2	2.2	5.9	1.3	1.7	2.0	2.6
ca	19	22.1	22.4	28.1	29.3	32.0	29.6	23.6	25.6
mg	12	12.9	11.2	14.1	13.2	14.7	16.8	13.3	13.2
al	0	2.8	2.2	2.2	2.9	1.3	12.3	5.3	4.4
nh4	0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5
no3	3	3.7	1.1	1.1	2.9	2.7	2.4	3.3	2.2
cl	62	59.9	25.8	33.5	36.6	33.3	57.9	51.2	41.0
so4	22	39.6	38.2	57.3	49.8	58.7	73.0	43.9	50.8
hco3	9	4.6	2.2	0.0	7.3	1.3	0.8	1.1	2.4
SBC*	18.2	31.2	38.7	41.7	45.8	44.3	33.5	27.6	36.1
SBC	87.0	97.6	67.3	78.9	86.4	81.3	97.8	84.4	81.6
SSA	87.0	103.1	65.1	91.9	89.3	94.7	133.3	98.4	94.1
c-alk	0.0	-5.5	2.2	-13.0	-2.9	-13.3	-35.5	-14.0	-12.4
F		0.73	1.03	0.62	0.91	0.66	0.30	0.41	0.58
Ca*+Mg*	29.5	33.6	33.1	41.4	41.6	45.9	45.0	35.6	37.9
SO4*	15.6	33.4	35.5	53.8	46.0	55.2	67.0	38.7	46.6

	sog3	concentrations							
	1983 pre	1984	1985	1986	1987	1988	1989	1990	avg
mm									
pH	5.5	5.4	5.9	5.9	5.6	5.9	5.6	5.6	5.6
h	3	3.9	1.2	1.2	2.5	1.3	2.2	2.4	2.3
na	50	78.0	32.6	30.3	38.0	30.0	46.2	42.6	46.9
k	0	1.9	1.2	0.0	1.3	1.3	1.2	1.3	1.3
ca	19	20.5	15.7	17.5	19.0	16.9	13.6	12.4	17.0
mg	9	18.5	8.5	8.2	10.1	9.1	11.4	10.4	11.8
al	0	0.0	0.0	0.0	1.3	0.0	0.6	1.1	0.5
nh4	0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
no3	0	1.9	0.0	0.0	0.0	0.0	0.4	1.2	0.6
cl	41	82.8	25.4	26.8	36.7	26.1	51.9	48.7	48.4
so4	22	24.4	21.7	23.3	22.8	22.2	20.9	19.6	23.3
hco3	6	1.0	4.8	3.5	7.6	9.1	3.9	7.9	5.6
SBC*	32.5	26.9	29.8	26.2	27.6	28.4	14.9	12.5	23.3
SBC	78.0	118.9	58.0	56.0	68.4	57.4	72.4	66.6	77.0
SSA	63.0	109.2	47.1	50.2	59.5	48.2	73.2	69.5	72.3
c-alk	15.0	9.7	10.9	5.8	8.9	9.1	-0.8	-2.9	4.7

	sog4	concentrations							
	1983 pre	1984	1985	1986	1987	1988	1989	1990	avg
mm									
pH	6	5.4	5.3	5.2	5.4	5.2	4.8	4.8	5.1
h	1	3.7	4.5	6.5	4.2	5.6	16.1	14.9	8.0
na	38	50.6	41.5	29.0	37.6	29.6	59.3	48.2	41.6
k	3	1.8	1.1	2.2	2.8	1.4	2.0	2.4	1.9
ca	22	25.8	20.2	26.9	26.5	28.2	41.4	32.3	27.9
mg	9	12.0	9.0	10.8	11.1	11.3	18.7	15.3	12.3
al	0	0.9	0.0	1.1	2.8	0.0	9.5	4.6	2.9
nh4	0	0.9	1.1	0.0	0.0	0.0	0.0	0.0	0.3
no3	0	3.7	1.1	6.5	2.8	5.6	12.9	19.7	7.6
cl	38	57.1	25.8	25.8	34.8	28.2	66.4	52.1	41.6
so4	19	25.8	23.6	45.2	36.2	36.6	63.9	41.9	38.1
hco3	12	6.4	6.7	1.1	1.4	4.2	4.5	2.3	3.7
SBC*	29.8	26.9	43.2	40.2	39.3	39.2	47.7	40.5	37.6
SBC	72.0	90.2	71.8	68.8	78.0	70.4	121.4	98.3	83.7
SSA	57.0	86.6	50.5	77.4	73.8	70.4	143.2	113.8	87.2
c-alk	15.0	3.7	21.3	-8.6	4.2	0.0	-21.8	-15.5	-3.5
F		-0.35	1.92	0.31	0.47	0.38	0.33	0.26	0.29
Ca*+Mg*	30.1	36.4	28.6	37.0	36.8	38.8	58.6	46.4	39.3
SO4*	15.1	19.9	20.9	42.5	32.6	33.7	57.1	36.6	33.8

Sogndal fluxes. Year 1988 16.11.87 27.11.88

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	933	767	949	750	933	767	899	710
H+	19.4	1.7	118.8	6.1	19.4	1.3	117.2	4.5
Na	26.9	28.7	26.7	24.9	26.9	22.6	24.3	21.3
K	5.2	1.2	4.9	1.1	5.2	0.8	4.4	1.3
Ca	4.8	16.3	5.6	23.6	4.8	12.6	5.3	19.8
Mg	5.9	8.6	6.1	11.3	5.9	6.7	5.3	7.7
Al	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.4
NH4	10.4	0.0	9.8	0.0	10.4	0.0	9.1	0.0
NO3	10.1	1.4	9.5	2.5	10.1	0.5	59.4	3.6
Cl	28.9	27.6	28.2	24.6	28.9	20.5	25.7	19.9
SO4	19.3	20.4	120.6	43.8	19.3	16.9	68.6	26.2
HCO3	0.0	6.8	0.0	1.2	0.0	6.7	0.0	3.0
Sum +	72.68	56.64	171.78	67.58	72.68	44.07	165.73	54.89
Sum -	58.30	56.17	158.29	72.04	58.30	44.56	153.65	52.74
SBC	42.91	54.83	43.22	60.89	42.91	42.78	39.42	49.99
SSA	58.30	49.35	158.29	70.86	58.30	37.83	153.65	49.75
alk	-15.39	5.48	-115.07	-9.97	-15.39	4.95	-114.23	0.24
TOC	0.0	0.6		0.9		0.5		1.8
SiO2	0.0	2.7		1.3		1.0		1.2

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	933	767	949	750	933	767	899	710
H+	20.8	2.2	125.2	8.2	20.8	1.6	130.3	6.3
Na	28.9	37.4	28.1	33.2	28.9	29.5	27.1	29.9
K	5.6	1.6	5.1	1.4	5.6	1.0	4.9	1.8
Ca	5.2	21.3	5.9	31.5	5.2	16.4	5.9	27.9
Mg	6.4	11.3	6.4	15.0	6.4	8.8	5.9	10.8
Al	0.0	0.2	0.0	0.8	0.0	0.1	0.0	0.6
NH4	11.1	0.0	10.3	0.0	11.1	0.0	10.1	0.0
NO3	10.8	1.8	10.0	3.4	10.8	0.6	66.1	5.1
Cl	30.9	36.0	29.7	32.8	30.9	26.7	28.5	28.0
SO4	20.7	26.6	127.1	58.4	20.7	22.0	76.3	37.0
HCO3	0.0	8.9	0.0	1.6	0.0	8.8	0.0	4.2
Sum +	77.9	73.8	181.0	90.2	77.9	57.4	184.3	77.3
Sum -	62.5	73.2	166.8	96.1	62.5	58.1	170.9	74.3
SBC	46.0	71.5	45.5	81.2	46.0	55.7	43.8	70.4
SSA	62.5	64.3	166.8	94.5	62.5	49.3	170.9	70.1
alk	-16.5	7.1	-121.3	-13.3	-16.5	6.5	-127.0	0.3
TOC	0.0	0.8	0.0	1.2	0.0	0.7	0.0	2.5
SiO2	0.0	3.5	0.0	1.8	0.0	1.3	0.0	1.7

Sogndal fluxes. Winter 1988 16.11.87 12.06.88

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	426	426	372	374	426	426	315	316
H+	12.3	1.3	55.7	4.9	12.3	0.9	54.1	2.1
Na	19.5	16.6	17.1	12.3	19.5	11.0	14.4	9.4
K	3.5	0.7	3.0	0.6	3.5	0.5	2.6	0.5
Ca	3.1	9.1	2.7	10.2	3.1	5.6	2.3	7.3
Mg	3.9	5.4	3.4	5.7	3.9	3.7	2.9	3.5
Al	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.1
NH4	4.9	0.0	4.3	0.0	4.9	0.0	3.6	0.0
NO3	4.6	1.1	4.0	2.3	4.6	0.3	25.9	1.8
Cl	20.3	17.8	17.8	13.4	20.3	11.8	15.0	9.4
SO4	12.1	11.6	55.6	23.4	12.1	8.7	31.4	10.4
HCO3	0.0	2.2	0.0	0.1	0.0	1.9	0.0	0.7
Sum +	47.1	33.2	86.1	34.2	47.1	21.8	79.8	23.0
Sum -	37.0	32.7	77.4	39.1	37.0	22.6	72.3	22.2
SBC	29.9	31.8	26.1	28.9	29.9	20.8	22.1	20.7
SSA	37.0	30.6	77.4	39.1	37.0	20.7	72.3	21.5
alk	-7.1	1.3	-51.3	-10.2	-7.1	0.1	-50.2	-0.8
TOC	0.0	0.3		0.5		0.3		0.6
SiO2	0.0	2.2		0.5		0.4		0.4

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	426	426	372	374	426	426	315	316
H+	28.8	3.1	149.7	13.0	28.8	2.2	171.7	6.8
Na	45.8	38.8	45.9	32.9	45.8	25.8	45.8	29.7
K	8.1	1.7	8.1	1.6	8.1	1.1	8.2	1.7
Ca	7.2	21.4	7.2	27.4	7.2	13.2	7.2	23.1
Mg	9.1	12.7	9.1	15.4	9.1	8.7	9.0	11.0
Al	0.0	0.2	0.0	1.2	0.0	0.1	0.0	0.4
NH4	11.5	0.0	11.5	0.0	11.5	0.0	11.5	0.0
NO3	10.8	2.7	10.8	6.0	10.8	0.7	82.2	5.6
Cl	47.7	41.8	47.7	35.9	47.7	27.6	47.7	29.7
SO4	28.4	27.2	149.5	62.7	28.4	20.3	99.7	32.9
HCO3	0.0	5.0	0.0	0.1	0.0	4.5	0.0	2.1
Sum +	110.6	77.9	231.5	91.5	110.6	51.1	253.5	72.8
Sum -	86.9	76.8	208.0	104.7	86.9	53.1	229.7	70.3
SBC	70.2	74.7	70.2	77.3	70.2	48.8	70.3	65.6
SSA	86.9	71.7	208.0	104.6	86.9	48.6	229.7	68.2
alk	-16.7	3.0	-137.8	-27.3	-16.7	0.2	-159.4	-2.6
TOC	0.0	0.6	0.0	1.3	0.0	0.7	0.0	1.9
SiO2	0.0	5.0	0.0	1.3	0.0	0.8	0.0	1.2

Sogndal fluxes. Summer 1988 16.06.88 27.11.88

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	507	341	577	376	507	341	584	395
H+	7.10	0.35	63.10	1.25	7.10	0.32	63.10	2.36
Na	7.40	12.10	9.60	12.61	7.40	11.62	9.90	11.88
K	1.75	0.46	1.85	0.47	1.75	0.33	1.85	0.71
Ca	1.76	7.22	2.96	13.40	1.76	6.99	3.06	12.49
Mg	2.08	3.24	2.68	5.54	2.08	3.02	2.48	4.22
Al	0.00	0.09	0.00	0.12	0.00	0.00	0.00	0.26
NH4	5.49	0.00	5.49	0.00	5.49	0.00	5.49	0.00
NO3	5.49	0.22	5.49	0.28	5.49	0.20	33.50	1.85
Cl	8.51	9.78	10.41	11.15	8.51	8.71	10.61	10.52
SO4	7.26	8.80	65.00	20.38	7.26	8.20	37.20	15.86
HCO3	0.00	4.67	0.00	1.13	0.00	4.81	0.00	2.32
Sum +	25.58	23.46	85.68	33.39	25.58	22.28	85.88	31.92
Sum -	21.26	23.47	80.90	32.94	21.26	21.92	81.31	30.55
SBC	12.99	23.02	17.09	32.02	12.99	21.96	17.29	29.30
SSA	21.26	18.80	80.90	31.81	21.26	17.11	81.31	28.23
alk	-8.27	4.22	-63.81	0.21	-8.27	4.85	-64.02	1.07
TOC		0.34		0.42		0.26		1.17
SiO2		0.55		0.86		0.67		0.83

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	507	341	577	376	507	341	584	395
H+	14.0	1.0	109.4	3.3	14.0	0.9	108.0	6.0
Na	14.6	35.5	16.6	33.5	14.6	34.1	16.9	30.1
K	3.5	1.3	3.2	1.2	3.5	1.0	3.2	1.8
Ca	3.5	21.2	5.1	35.6	3.5	20.5	5.2	31.7
Mg	4.1	9.5	4.6	14.7	4.1	8.9	4.2	10.7
Al	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.7
NH4	10.8	0.0	9.5	0.0	10.8	0.0	9.4	0.0
NO3	10.8	0.6	9.5	0.7	10.8	0.6	57.3	4.7
Cl	16.8	28.7	18.0	29.6	16.8	25.5	18.2	26.7
SO4	14.3	25.8	112.7	54.2	14.3	24.0	63.7	40.2
HCO3	0.0	13.7	0.0	3.0	0.0	14.1	0.0	5.9
Sum +	50.4	68.8	148.5	88.8	50.4	65.3	147.0	80.9
Sum -	41.9	68.8	140.2	87.6	41.9	64.3	139.2	77.4
SBC	25.6	67.5	29.6	85.1	25.6	64.4	29.6	74.3
SSA	41.9	55.1	140.2	84.6	41.9	50.2	139.2	71.6
alk	-16.3	12.4	-110.6	0.6	-16.3	14.2	-109.6	2.7
TOC	0.0	1.0	0.0	1.1	0.0	0.8	0.0	3.0
SiO2	0.0	1.6	0.0	2.3	0.0	2.0	0.0	2.1

Sogndal fluxes. Year 1989 28.11.88 01.11.89
27-Mar 91

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1684	1677	1422	1292	1684	1677	1450	1250
H+	18	2	115	14	18	4	93	20
Na	71	68	60	64	71	78	67	74
K	5	2	4	2	5	2	5	3
Ca	7	20	6	38	7	23	6	52
Mg	16	17	14	22	16	19	16	23
Al	0	2	0	16	0	1	0	12
NH4	8	0	7	0	8	0	8	0
NO3	10	1	8	3	10	1	59	16
Cl	85	87	73	75	85	87	81	83
SO4	28	22	126	94	28	35	78	80
HCO3	0	4	0	1	0	6	0	6
Sum +	125	111	207	156	125	126	194	184
Sum -	123	114	207	173	123	129	218	185
SBC	99	107	85	126	99	121	94	152
SSA	123	110	207	172	123	127	218	179
alk	-24	-4	-122	-46	-24	-5	-124	-27
TOC	0.0	0.4	0.0	1.0	0.0	0.6	0.0	2.0
SiO2	0	1	0	2	0	1	0	3

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1684	1677	1422	1292	1684	1677	1450	1250
H+	10.7	1.4	80.6	11.0	10.7	2.2	64.2	16.1
Na	42.2	40.3	42.5	49.6	42.2	46.2	46.3	59.3
K	2.9	1.2	3.0	1.7	2.9	1.2	3.1	2.0
Ca	4.2	12.1	4.3	29.6	4.2	13.6	4.4	41.4
Mg	9.6	10.0	9.8	16.8	9.6	11.4	10.8	18.7
Al	0.0	1.3	0.0	12.3	0.0	0.6	0.0	9.5
NH4	4.6	0.0	5.1	0.0	4.6	0.0	5.2	0.0
NO3	6.0	0.6	5.8	2.4	6.0	0.4	40.7	12.9
Cl	50.6	52.0	51.3	57.9	50.6	51.9	56.1	66.4
SO4	16.7	13.3	88.7	73.0	16.7	20.9	53.5	63.9
HCO3	0.0	2.3	0.0	0.8	0.0	3.9	0.0	4.5
Sum +	74.1	66.2	145.4	121.1	74.1	75.3	134.0	147.0
Sum -	73.3	68.2	145.8	134.1	73.3	77.1	150.3	147.8
SBC	58.8	63.6	59.6	97.8	58.8	72.4	64.6	121.4
SSA	73.3	65.9	145.8	133.3	73.3	75.5	150.3	143.2
alk	-14.4	-2.3	-86.1	-35.5	-14.4	-3.1	-85.7	-21.8
TOC	0.0	0.2	0.0	0.8	0.0	0.4	0.0	1.6
SiO2	0.0	0.6	0.0	1.5	0.0	0.9	0.0	2.4

Sogndal fluxes. Winter 1989 Units: meq/m2/yr
27-Mar 91 28.11.88 10.07.89

	SOG1			SOG2			SOG3			SOG4		
	In	Out meas.	Out corr.	In	Out meas.	Out corr.	In	Out meas.	Out corr.	In	Out meas.	Out corr.
H2O	1339	1354	1354	1002	926	926	1339	1354	1354	1038	910	910
H+	11.4	5.5	1.9	53.0	12.2	11.8	11.4	4.2	3.4	31.5	9.7	16.8
Na	63.7	157.0	54.0	53.0	52.7	50.9	63.7	80.7	64.7	59.7	35.6	61.6
K	3.9	4.0	1.4	3.4	1.8	1.7	3.9	2.1	1.7	3.6	1.1	1.9
Ca	5.9	42.6	14.7	5.0	27.0	26.1	5.9	21.9	17.6	5.3	22.2	38.4
Mg	14.4	39.4	13.6	12.2	17.0	16.4	14.4	20.0	16.0	13.9	10.6	18.3
Al	0.0	6.3	2.2	0.0	13.7	13.2	0.0	1.3	1.0	0.0	4.9	8.5
NH4	5.4	0.0	0.0	5.0	0.0	0.0	5.4	0.0	0.0	5.2	0.0	0.0
NO3	6.9	2.4	0.8	5.1	2.8	2.7	6.9	0.7	0.6	27.8	6.2	10.7
Cl	75.7	220.0	75.7	63.4	65.6	63.4	75.7	94.4	75.7	71.8	41.5	71.8
SO4	20.8	38.1	13.1	60.8	71.6	69.2	20.8	34.8	27.9	40.3	34.8	60.2
HCO3	0.0	5.6	1.9	0.0	0.6	0.6	0.0	5.6	4.5	0.0	2.3	4.0
Sum +	104.7	254.8	87.7	131.6	124.4	120.2	104.7	130.2	104.4	119.2	84.1	145.5
Sum -	103.4	266.1	91.6	129.3	140.6	135.9	103.4	135.5	108.7	139.9	84.8	146.7
SBC	87.9	243.0	83.6	73.6	98.5	95.2	87.9	124.7	100.0	82.5	69.5	120.2
SSA	103.4	260.5	89.6	129.3	140.0	135.3	103.4	134.8	108.1	139.9	82.5	142.7
alk	-15.5	-17.5	-6.0	-55.7	-41.5	-40.1	-15.5	-10.1	-8.1	-57.4	-13.0	-22.5
TOC		0.5	0.2		0.7	0.7		0.5	0.4		0.8	1.4
SiO2		1.7	0.6		1.3	1.3		1.2	1.0		1.3	2.2

ConcentrationsUnits: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1339	1354	1002	926	1339	1354	1038	910
H+	8.5	1.4	52.9	12.7	8.5	2.5	30.3	18.4
Na	47.6	39.9	52.9	55.0	47.6	47.8	57.5	67.7
K	2.9	1.0	3.4	1.9	2.9	1.2	3.5	2.1
Ca	4.4	10.8	5.0	28.2	4.4	13.0	5.1	42.2
Mg	10.8	10.0	12.2	17.7	10.8	11.8	13.4	20.2
Al	0.0	1.6	0.0	14.3	0.0	0.8	0.0	9.3
NH4	4.0	0.0	5.0	0.0	4.0	0.0	5.0	0.0
NO3	5.2	0.6	5.1	2.9	5.2	0.4	26.8	11.8
Cl	56.5	55.9	63.3	68.5	56.5	55.9	69.2	78.9
SO4	15.5	9.7	60.7	74.7	15.5	20.6	38.8	66.2
HCO3	0.0	1.4	0.0	0.6	0.0	3.3	0.0	4.4
Sum +	78.2	64.8	131.3	129.8	78.2	77.1	114.8	159.9
Sum -	77.2	67.6	129.0	146.7	77.2	80.2	134.8	161.2
SBC	65.6	61.8	73.5	102.8	65.6	73.9	79.5	132.1
SSA	77.2	66.2	129.0	146.1	77.2	79.8	134.8	156.9
alk	-11.6	-4.4	-55.6	-43.3	-11.6	-6.0	-55.3	-24.7
TOC	0.0	0.1	0.0	0.7	0.0	0.3	0.0	1.5
SiO2	0.0	0.4	0.0	1.4	0.0	0.7	0.0	2.5

Sogndal fluxes. Summer 1989 Units: meq/m2
27-Mar 91 11.07.89 01.11.89

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	345	323	420	366	345	323	412	340
H+	6.6	0.4	61.6	2.4	6.6	0.4	61.6	3.3
Na	7.4	13.6	7.4	13.2	7.4	12.8	7.4	12.5
K	0.9	0.6	0.9	0.5	0.9	0.4	0.9	0.6
Ca	1.1	5.6	1.1	12.1	1.1	5.3	1.1	13.4
Mg	1.8	3.2	1.8	5.3	1.8	3.0	1.8	5.0
Al	0.0	0.0	0.0	2.7	0.0	0.0	0.0	3.4
NH4	2.3	0.0	2.3	0.0	2.3	0.0	2.3	0.0
NO3	3.2	0.1	3.2	0.4	3.2	0.1	31.2	5.4
Cl	9.5	11.5	9.5	11.4	9.5	11.3	9.5	11.2
SO4	7.3	9.2	65.3	25.1	7.3	7.2	37.3	19.7
HCO3	0.0	2.0	0.0	0.5	0.0	2.0	0.0	1.7
Sum +	20.1	23.4	75.1	36.2	20.1	21.9	75.1	38.2
Sum -	20.0	22.8	78.0	37.4	20.0	20.6	78.0	38.0
SBC	11.2	23.0	11.2	31.1	11.2	21.5	11.2	31.5
SSA	20.0	20.8	78.0	36.9	20.0	18.6	78.0	36.3
alk	-8.8	2.2	-66.8	-5.8	-8.8	2.9	-66.8	-4.8
TOC		0.2		0.3		0.2		0.6
SiO2		0.4		0.7		0.5		0.7

ConcentrationsUnits: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	345	323	420	366	345	323	412	340
H+	19.1	1.2	146.7	6.6	19.1	1.2	149.5	9.7
Na	21.4	42.1	17.6	36.1	21.4	39.6	18.0	36.8
K	2.6	1.9	2.1	1.4	2.6	1.2	2.2	1.8
Ca	3.2	17.3	2.6	33.1	3.2	16.4	2.7	39.4
Mg	5.2	9.9	4.3	14.5	5.2	9.3	4.4	14.7
Al	0.0	0.0	0.0	7.4	0.0	0.0	0.0	10.0
NH4	6.7	0.0	5.5	0.0	6.7	0.0	5.6	0.0
NO3	9.3	0.3	7.6	1.1	9.3	0.3	75.7	15.9
Cl	27.5	35.6	22.6	31.1	27.5	35.0	23.1	32.9
SO4	21.2	28.5	155.5	68.6	21.2	22.3	90.5	57.9
HCO3	0.0	6.2	0.0	1.4	0.0	6.2	0.0	5.0
Sum +	58.3	72.4	178.8	98.9	58.3	67.8	182.3	112.4
Sum -	58.0	70.6	185.7	102.2	58.0	63.8	189.3	111.8
SBC	32.5	71.2	26.7	85.0	32.5	66.6	27.2	92.6
SSA	58.0	64.4	185.7	100.8	58.0	57.6	189.3	106.8
alk	-25.5	6.8	-159.0	-15.8	-25.5	9.0	-162.1	-14.1
TOC	0.0	0.6	0.0	0.8	0.0	0.6	0.0	1.8
SiO2	0.0	1.2	0.0	1.9	0.0	1.5	0.0	2.1

Sogndal fluxes. Year 1990 01.11.89 03.11.90

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1382	1449	1124	997	1426	1449	1087	983
H+	13	3	111	8	13	3	112	15
Na	57	62	43	45	59	62	42	47
K	7	2	6	2	7	2	6	2
Ca	12	20	9	23	12	18	9	32
Mg	11	15	9	13	12	15	9	15
Al	0	0	0	5	0	2	0	5
NH4	10	0	9	0	8	0	9	0
NO3	10	1	8	3	9	2	59	19
Cl	68	72	50	51	71	71	48	51
SO4	25	29	123	44	23	28	72	41
HCO3	0	5	0	1	0	11	0	2
Sum +	110	102	187	97	110	102	185	116
Sum -	102	106	181	99	102	112	179	114
SBC	88	99	67	84	89	96	65	97
SSA	102	101	181	98	102	105	179	112
alk	-14	-2	-114	-14	-14	-9	-114	-15
TOC	0	1	0	1	0	1	0	2
SiO2	0	1	0	1	0	1	0	1

Concentrations. Units: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1382	1449	1124	997	1426	1449	1087	983
H+	9.0	1.8	98.7	7.5	9.1	2.4	102.9	14.9
Na	41.4	42.9	38.4	45.5	41.2	42.6	38.4	48.2
K	5.3	1.4	5.1	2.0	4.6	1.3	5.1	2.4
Ca	8.5	13.6	8.4	23.6	8.1	12.4	8.4	32.3
Mg	8.2	10.2	7.7	13.3	8.1	10.4	7.8	15.3
Al	0.0	0.1	0.0	5.3	0.0	1.1	0.0	4.6
NH4	7.0	0.0	7.7	0.0	5.6	0.0	7.8	0.0
NO3	6.9	0.7	7.4	3.3	6.1	1.2	54.0	19.7
Cl	48.9	49.4	44.7	51.2	49.4	48.7	44.5	52.1
SO4	17.8	19.7	109.3	43.9	16.2	19.6	66.1	41.9
HCO3	0.0	3.3	0.0	1.1	0.0	7.9	0.0	2.3
Sum +	79.5	70.1	165.9	97.2	76.8	70.1	170.3	117.8
Sum -	73.6	73.1	161.3	99.4	71.7	77.4	164.6	116.0
SBC	63.5	68.2	59.6	84.4	62.1	66.6	59.6	98.3
SSA	73.6	69.8	161.3	98.4	71.7	72.7	164.6	113.8
alk	-10.1	-1.6	-101.7	-14.0	-9.7	-6.1	-105.0	-15.5
TOC	0.0	0.4	0.0	0.8	0.0	0.5	0.0	2.3
SiO2	0.0	0.8	0.0	1.4	0.0	0.8	0.0	1.5

Sogndal fluxes. Winter 1990 Units: meq/m2/yr
27-Mar 01.11.89 17.06.90

	SOG1			SOG2			SOG3			SOG4		
	In meas.	Out meas.	Out corr.	In	Out meas.	Out corr.	In	Out meas.	Out corr.	In	Out meas.	Out corr.
H2O	1081	1095	1095	748	694	694	1081	1095	1095	719	662	662
H+	6.4	2.6	1.7	49.8	7.6	5.8	6.4	3.7	2.9	49.7	4.7	5.7
Na	51.4	73.6	49.2	35.2	45.5	34.8	51.4	62.9	49.8	33.8	28.7	35.0
K	5.7	2.3	1.5	4.0	2.1	1.6	5.7	1.8	1.4	3.8	1.4	1.7
Ca	10.4	22.9	15.3	7.2	18.3	14.0	10.4	17.3	13.7	6.9	13.7	16.7
Mg	9.8	18.1	12.1	6.7	12.5	9.6	9.8	15.4	12.2	6.5	7.5	9.1
Al	0	0.2	0.1	0.0	4.7	3.6	0	1.8	1.4	0.0	2.9	3.5
NH4	5.7	0.0	0.0	4.6	0.0	0.0	5.7	0.0	0.0	4.5	0.0	0.0
NO3	5.5	1.3	0.9	4.3	3.6	2.8	5.5	2.1	1.7	26.7	2.8	3.4
Cl	61	91.2	61.0	41.8	54.7	41.8	61	77.0	61.0	40.1	32.9	40.1
SO4	15.8	31.1	20.8	56.5	35.6	27.2	15.8	26.8	21.2	33.6	20.7	25.2
HCO3	0	6.0	4.0	0.0	1.0	0.8	0	8.0	6.3	0.0	0.6	0.7
Sum +	89.4	119.7	80.1	107.5	90.7	69.3	89.4	102.9	81.5	105.2	58.9	71.8
Sum -	82.3	129.6	86.7	102.6	94.9	72.5	82.3	113.9	90.2	100.4	57.0	69.5
SBC	77.3	116.9	78.2	53.1	78.4	59.9	77.3	97.4	77.2	51.0	51.3	62.5
SSA	82.3	123.6	82.7	102.6	93.9	71.8	82.3	111.8	88.6	100.4	56.4	68.7
alk	-5.0	-6.7	-4.5	-49.5	-15.5	-11.8	-5.0	-14.4	-11.4	-49.4	-5.1	-6.2
TOC		0.5	0.3		0.7	0.5		0.6	0.5		0.9	1.1
SiO2		1.3	0.9		1.0	0.8		1.0	0.8		0.9	1.1

ConcentrationsUnits: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	1081	1095	748	694	1081	1095	719	662
H+	5.9	1.6	66.6	8.4	5.9	2.7	69.1	8.7
Na	47.5	45.0	47.1	50.1	47.5	45.5	47.0	52.8
K	5.3	1.4	5.3	2.3	5.3	1.3	5.3	2.6
Ca	9.6	14.0	9.6	20.2	9.6	12.5	9.6	25.2
Mg	9.1	11.1	9.0	13.8	9.1	11.1	9.0	13.8
Al	0.0	0.1	0.0	5.2	0.0	1.3	0.0	5.3
NH4	5.3	0.0	6.1	0.0	5.3	0.0	6.3	0.0
NO3	5.1	0.8	5.7	4.0	5.1	1.5	37.1	5.2
Cl	56.4	55.7	55.9	60.2	56.4	55.7	55.8	60.6
SO4	14.6	19.0	75.5	39.2	14.6	19.4	46.7	38.1
HCO3	0.0	3.7	0.0	1.1	0.0	5.8	0.0	1.1
Sum +	82.7	73.1	143.7	99.9	82.7	74.4	146.3	108.4
Sum -	76.1	79.2	137.2	104.5	76.1	82.4	139.6	104.9
SBC	71.5	71.4	71.0	86.3	71.5	70.5	70.9	94.5
SSA	76.1	75.5	137.2	103.4	76.1	80.9	139.6	103.8
alk	-4.6	-4.1	-66.2	-17.1	-4.6	-10.4	-68.7	-9.4
TOC	0.0	0.3	0.0	0.8	0.0	0.4	0.0	1.7
SiO2	0.0	0.8	0.0	1.1	0.0	0.7	0.0	1.7

Sogndal fluxes.   Summer 1990   Units: meq/m2

27-Mar 91   18.06.90   03.11.90

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	301	354	376	303	345	354	368	321
H+	6.1	0.9	61.1	1.7	6.6	0.5	62.1	8.9
Na	5.8	13.0	8.0	10.6	7.4	11.9	7.9	12.4
K	1.6	0.5	1.7	0.4	0.9	0.4	1.7	0.7
Ca	1.4	4.4	2.2	9.5	1.1	4.2	2.2	15.1
Mg	1.6	2.7	2.0	3.7	1.8	2.8	2.0	5.9
Al	0.0	0.0	0.0	1.7	0.0	0.2	0.0	1.0
NH4	4.0	0.0	4.0	0.0	2.3	0.0	4.0	0.0
NO3	4.0	0.1	4.0	0.5	3.2	0.1	32.0	16.0
Cl	6.6	10.6	8.4	9.2	9.5	9.6	8.3	11.1
SO4	8.8	7.7	66.3	16.6	7.3	7.1	38.2	16.0
HCO3	0.0	0.8	0.0	0.3	0.0	5.1	0.0	1.5
Sum +	20.5	21.5	79.0	27.6	20.1	20.0	79.9	44.0
Sum -	19.4	19.2	78.7	26.6	20.0	21.9	78.5	44.6
SBC	10.4	20.6	13.9	24.2	11.2	19.3	13.8	34.1
SSA	19.4	18.4	78.7	26.3	20.0	16.8	78.5	43.1
alk	-9.0	2.2	-64.8	-2.1	-8.8	2.5	-64.7	-9.0
TOC		0.2		0.3		0.2		1.2
SiO2		0.3		0.6		0.4		0.4

ConcentrationsUnits: ueq/l, mg C/l, mg SiO2/l

	SOG1		SOG2		SOG3		SOG4	
	In	Out	In	Out	In	Out	In	Out
H2O	301	354	376	303	345	354	368	321
H+	20.3	2.5	162.5	5.6	19.1	1.4	168.8	27.7
Na	19.3	36.7	21.3	35.0	21.4	33.6	21.5	38.6
K	5.3	1.4	4.5	1.3	2.6	1.1	4.6	2.2
Ca	4.7	12.4	5.9	31.4	3.2	11.9	6.0	47.0
Mg	5.3	7.6	5.3	12.2	5.2	7.9	5.4	18.4
Al	0.0	0.0	0.0	5.6	0.0	0.6	0.0	3.1
NH4	13.3	0.0	10.6	0.0	6.7	0.0	10.9	0.0
NO3	13.3	0.3	10.6	1.7	9.3	0.3	87.0	49.8
Cl	21.9	29.9	22.3	30.4	27.5	27.1	22.6	34.6
SO4	29.2	21.8	176.3	54.8	21.2	20.1	103.8	49.8
HCO3	0.0	2.3	0.0	1.0	0.0	14.4	0.0	4.7
Sum +	68.1	60.7	210.1	91.1	58.3	56.5	217.1	137.1
Sum -	64.5	54.2	209.3	87.8	58.0	61.9	213.3	138.9
SBC	34.6	58.2	37.0	79.9	32.5	54.5	37.5	106.2
SSA	64.5	52.0	209.3	86.8	58.0	47.5	213.3	134.3
alk	-29.9	6.2	-172.3	-6.9	-25.5	7.1	-175.8	-28.0
TOC	0.0	0.6	0.0	1.0	0.0	0.6	0.0	3.7
SiO2	0.0	0.8	0.0	2.0	0.0	1.1	0.0	1.2

APPENDIX 6

Appendix 6. Risdalsheia. Discharge

Discharge mm/day

		EGIL	KIM	ROLF
1987	1126	0.1	0.7	0.4
1987	1127	0.2	0.7	0.4
1987	1128	0.1	0.8	0.4
1987	1129	0.1	0.7	0.4
1987	1130	0.2	0.7	0.4
1987	1201	0.1	0.7	0.5
1987	1202	0.1	0.8	0.4
1987	1203	0.2	0.7	0.4
1987	1204	0.1	0.7	0.4
1987	1205	0.1	0.7	0.4
1987	1206	0.2	0.8	0.4
1987	1207	0.1	0.7	0.4
1987	1208	0.1	0.7	0.4
1987	1209	0.2	0.7	0.4
1987	1210	0.1	0.8	0.4
1987	1211	0.1	0.7	0.4
1987	1212	0.2	0.2	2.9
1987	1213	0.1	0.2	2.9
1987	1214	0.1	0.2	2.9
1987	1215	0.2	0.2	2.9
1987	1216	0.1	0.2	2.9
1987	1217	0.1	0.2	2.9
1987	1218	0.1	0.2	2.9
1987	1219	0.1	0.2	2.9
1987	1220	0.1	0.2	2.9
1987	1221	0.1	0.2	2.9
1987	1222	0.1	0.2	2.9
1987	1223	0.1	0.2	2.9
1987	1224	0.1	0.2	2.9
1987	1225	0.1	0.2	2.9
1987	1226	0.1	0.2	2.9
1987	1227	0.1	0.2	2.9
1987	1228	0.1	0.2	2.9
1987	1229	0.1	0.2	2.9
1987	1230	0.1	0.2	2.9
1987	1231	0.1	0.2	2.9
1988	101	0.2	0.2	3
1988	102	0.2	0.2	3
1988	103	0.2	0.2	3
1988	104	0.2	0.2	3
1988	105	0.2	0.2	3
1988	106	0.2	0.2	3
1988	107	0.7	0.2	3
1988	108	0.5	0.5	11.9
1988	109	0.5	0.6	11.9
1988	110	0.5	0.5	11.9
1988	111	0.5	0.6	11.9
1988	112	0.5	0.5	4.6
1988	113	0.5	0.6	4.6
1988	114	0	0.2	12.9
1988	115	0.6	0.2	14.7
1988	116	0.6	0.2	14.7
1988	117	0.6	0.2	14.7
1988	118	0.6	0.2	14.7
1988	119	0.6	0.2	14.7
1988	120	0.6	0.2	14.7
1988	121	0.6	0.2	14.7
1988	122	0.4	0.2	2.4
1988	123	0.4	0.2	2.4
1988	124	0.4	0.2	2.4

Discharge mm/day		EGIL	KIM	ROLF
1988	125	0.4	0.2	2.4
1988	126	0.4	0.2	2.4
1988	127	0.4	0.2	2.4
1988	128	0.4	0.2	2.4
1988	129	3.1	1.2	9.7
1988	130	3.1	1.2	9.7
1988	131	3.1	1.2	9.7
1988	201	3.1	1.2	9.7
1988	202	3.1	1.2	9.7
1988	203	3.1	1.2	9.7
1988	204	3.1	1.2	9.7
1988	205	2.4	1.5	12.6
1988	206	2.4	1.5	12.6
1988	207	2.4	1.5	12.6
1988	208	2.4	1.5	12.6
1988	209	2.4	1.5	12.6
1988	210	2.4	1.5	12.6
1988	211	2.4	1.5	12.6
1988	212	0.9	0.1	3.9
1988	213	0.9	0.1	3.9
1988	214	0.9	0.1	3.9
1988	215	0.9	0.1	3.9
1988	216	0.9	0.1	3.9
1988	217	0.9	0.1	3.9
1988	218	0.9	0.1	3.9
1988	219	0.1	0.7	1.2
1988	220	0.1	0.7	1.2
1988	221	0.1	0.7	1.2
1988	222	0.1	0.7	1.2
1988	223	0.1	0.7	1.2
1988	224	0.1	0.7	1.2
1988	225	0.1	0.7	1.2
1988	226	0.1	0.7	1.2
1988	227	0.1	0.7	1.2
1988	228	0.1	0.7	1.2
1988	229	0.1	0.7	1.2
1988	301	0.5	7	0.9
1988	302	0.5	7.9	0.9
1988	303	0	0.8	0.7
1988	304	0	0.8	0.7
1988	305	0	0.8	0.7
1988	306	0	0.8	0.7
1988	307	0	0.8	0.7
1988	308	0	0.8	0.7
1988	309	0	0.8	0.7
1988	310	0	0.8	0.7
1988	311	0	1.2	0.4
1988	312	0	1.2	0.4
1988	313	0	1.2	0.4
1988	314	0.1	0.4	0.4
1988	315	0.1	0.4	0.4
1988	316	0.1	0.4	0.4
1988	317	0.1	0.4	0.4
1988	318	0.1	0.4	0.4
1988	319	0.1	0.4	0.4
1988	320	0.1	0.4	0.4
1988	321	0.1	0.4	0.4
1988	322	0.1	0.4	0.4
1988	323	0.1	0.4	0.4
1988	324	0.1	0.4	0.4
1988	325	8.9	0.5	9.2
1988	326	8.9	0.5	9.2

Discharge mm/day		EGIL	KIM	ROLF
1988	327	8.9	0.5	9.2
1988	328	8.9	0.5	9.2
1988	329	8.9	0.5	9.2
1988	330	8.9	0.5	9.2
1988	331	8.9	0.5	9.2
1988	401	8.9	0.5	9.2
1988	402	8.9	0.5	9.2
1988	403	8.9	0.5	9.2
1988	404	8.9	0.5	9.2
1988	405	8.9	0.5	9.2
1988	406	8.9	0.5	9.2
1988	407	8.9	4.6	9.2
1988	408	8.9	4.6	9.2
1988	409	7.3	4.6	5.5
1988	410	7.3	4.6	5.5
1988	411	7.3	4.6	5.5
1988	412	7.3	4.6	5.5
1988	413	7.3	4.6	5.5
1988	414	7.3	4.6	5.5
1988	415	8.7	5.7	22.4
1988	416	8.7	5.7	22.4
1988	417	8.7	5.7	22.4
1988	418	8.7	5.8	22.4
1988	419	8.8	5.8	22.4
1988	420	1.6	3.7	16.5
1988	421	1.7	3.7	16.5
1988	422	1.7	3.8	16.5
1988	423	3.7	2.5	5.5
1988	424	3.7	2.5	5.5
1988	425	3.8	2.5	5.5
1988	426	3.8	2.5	5.5
1988	427	4	2.5	5.5
1988	428	4	2.6	5.5
1988	429	2.3	2.6	9.2
1988	430	2.3	2.6	9.2
1988	501	2.3	2.6	9.2
1988	502	2.3	2.6	9.2
1988	503	2.4	2.7	9.2
1988	504	2.4	2.7	9.1
1988	505	0.6	2.4	1.4
1988	506	0.6	2.4	1.5
1988	507	0.6	2.4	1.5
1988	508	0.6	2.4	1.5
1988	509	0.6	2.5	1.5
1988	510	0.6	1.1	0
1988	511	0.6	1.2	0
	Sum	331.3	208.4	912.5
1988	512	0	0.1	0
1988	513	0	0.1	0
1988	514	0	0.1	0
1988	515	0	0.1	0
1988	516	0	0.1	0
1988	517	0	0.1	0
1988	518	0	0.1	0
1988	519	0	0.1	0
1988	520	0	0.1	0
1988	521	0	0.1	0
1988	522	0	0.2	0
1988	523	0	0.2	0
1988	524	0	0.2	0
1988	525	1.2	0.2	0

Discharge mm/day		EGIL	KIM	ROLF
1988	526	1.2	0.1	0.4
1988	527	1.2	0.1	0.4
1988	528	1.2	0.1	0.5
1988	529	1.2	0.1	0.5
1988	530	1.2	0.1	0.4
1988	531	1.2	0.1	0.5
1988	601	1.2	0.2	0.5
1988	602	1.2	0.1	0.5
1988	603	2.7	6.7	2
1988	604	2.7	6.7	2
1988	605	2.7	6.8	2.1
1988	606	2.7	6.8	2.1
1988	607	2.7	6.8	2
1988	608	2.7	6.8	2.1
1988	609	2.7	0	2.1
1988	610	2.7	0	2.1
1988	611	0	0	0
1988	612	0	0	0
1988	613	0	0	0
1988	614	0	0	0
1988	615	0	0	0
1988	616	0	0	0
1988	617	0	0	0
1988	618	0	0	0
1988	619	0	0	0
1988	620	0	0	0
1988	621	0	0	0
1988	622	0	0	0
1988	623	0	0	0
1988	624	0	0	0
1988	625	0	0	0
1988	626	0	0	0
1988	627	0	0	0
1988	628	0	0	0
1988	629	0	0	0
1988	630	0	0	0
1988	701	7.9	2.6	14.8
1988	702	7.9	2.6	14.9
1988	703	7.9	2.6	14.8
1988	704	7.9	2.7	14.9
1988	705	7.9	2.7	14.8
1988	706	7.9	2.7	14.9
1988	707	7.9	2.7	14.9
1988	708	11	5	7.9
1988	709	11.1	5	7.8
1988	710	11	5	7.9
1988	711	11.1	5	7.8
1988	712	11	5	7.9
1988	713	11.1	5	7.8
1988	714	11	5	7.9
1988	715	6.3	3.6	9
1988	716	6.3	3.6	9
1988	717	6.3	3.6	9
1988	718	6.4	3.7	9
1988	719	6.3	3.6	9
1988	720	6.3	3.7	9
1988	721	6.3	3.7	9
1988	722	6.4	3.7	9
1988	723	11.3	6.5	14.4
1988	724	11.3	6.5	14.4
1988	725	11.3	6.5	14.4
1988	726	11.3	6.5	14.4

Discharge mm/day		EGIL	KIM	ROLF
1988	727	11.3	6.5	14.4
1988	728	11.3	6.6	14.4
1988	729	11.3	6.6	14.5
1988	730	8.6	7.1	4.8
1988	731	8.6	7.1	4.8
1988	801	8.6	7.1	4.8
1988	802	8.6	7.2	4.8
1988	803	8.6	7.2	4.8
1988	804	8.6	7.2	4.8
1988	805	0.3	0	0
1988	806	0.3	0	0
1988	807	0.3	0	0
1988	808	0.3	0	0
1988	809	0.3	0	0
1988	810	0.3	0	0
1988	811	0.4	0	0
1988	812	6.6	4.4	3.9
1988	813	6.7	4.4	3.9
1988	814	6.6	4.4	3.9
1988	815	6.7	4.4	3.9
1988	816	6.6	4.5	3.9
1988	817	6.7	4.5	3.9
1988	818	6.6	4.4	4
1988	819	16.3	12.2	15.2
1988	820	16.3	12.2	15.2
1988	821	16.3	12.2	15.2
1988	822	16.3	12.2	15.2
1988	823	16.2	12.2	15.3
1988	824	16.2	12.2	15.3
1988	825	16.2	12.1	15.3
1988	826	16.2	12.1	15.3
1988	827	7.3	5.4	10.2
1988	828	7.3	5.4	10.2
1988	829	7.4	5.4	10.2
1988	830	7.4	5.4	10.2
1988	831	7.4	5.4	10.2
1988	901	7.4	5.4	10.2
1988	902	7.4	5.4	10.3
1988	903	8.4	7.9	5.5
1988	904	8.4	7.9	5.5
1988	905	8.4	7.9	5.5
1988	906	8.4	7.9	5.5
1988	907	8.4	7.9	5.5
1988	908	8.3	7.9	5.5
1988	909	8.3	7.8	5.5
1988	910	0.1	0	0
1988	911	0.1	0	0
1988	912	0.1	0	0
1988	913	0.1	0	0
1988	914	0.2	0	0
1988	915	0.2	0	0
1988	916	0.2	0	0
1988	917	0	0	0
1988	918	0	0	0
1988	919	0	0	0
1988	920	0	0	0
1988	921	0	0	0
1988	922	0	0	0
1988	923	6.5	4.2	0
1988	924	6.5	4.2	0
1988	925	6.5	4.2	0
1988	926	6.5	4.3	0

Discharge mm/day		EGIL	KIM	ROLF
1988	927	6.5	4.3	0
1988	928	6.5	4.3	0
1988	929	6.6	4.3	0
1988	930	6.1	6.7	5.2
1988	1001	6.1	6.7	5.2
1988	1002	6.1	6.7	5.3
1988	1003	6.1	6.7	5.3
1988	1004	6.1	6.7	5.3
1988	1005	6	6.7	5.3
1988	1006	6	6.7	5.3
1988	1007	6	6.7	5.3
1988	1008	6	12.5	12.5
1988	1009	12.5	12.6	12.5
1988	1010	12.5	12.6	12.5
1988	1011	12.5	12.6	12.6
1988	1012	12.5	12.6	12.6
1988	1013	12.5	12.6	12.6
1988	1014	5.1	5.2	2.6
1988	1015	5.1	5.2	2.6
1988	1016	5.1	5.2	2.6
1988	1017	5.1	5.2	2.6
1988	1018	5.1	5.2	2.6
1988	1019	5.1	5.2	2.6
1988	1020	5.1	5.2	2.7
1988	1021	3.3	4.2	2.3
1988	1022	3.3	4.2	2.3
1988	1023	3.3	4.2	2.3
1988	1024	3.3	4.2	2.4
1988	1025	3.4	4.3	2.4
1988	1026	3.4	4.3	2.4
1988	1027	3.4	4.3	2.4
1988	1028	3.4	1.4	1.1
1988	1029	1.5	1.4	1.1
1988	1030	1.5	1.4	1.1
1988	1031	1.5	1.4	1.1
1988	1101	1.6	1.4	1.2
1988	1102	1.6	1.4	1.2
1988	1103	1.6	1.4	1.2
1988	1104	1.6	1.4	1.2
1988	1105	3.8	2.3	2.1
1988	1106	3.8	2.3	2.1
1988	1107	3.8	2.3	2.1
1988	1108	3.8	2.3	2.1
1988	1109	3.8	2.3	2.1
1988	1110	3.9	2.4	2.1
1988	1111	3.8	2.4	2.1
1988	1112	0.5	0.9	0.5
1988	1113	0.5	0.9	0.5
1988	1114	0.6	0.9	0.5
1988	1115	0.6	0.8	0.5
1988	1116	0.6	0.9	0.5
1988	1117	0.6	0.9	0.6
1988	1118	0.6	0.9	0.6
1988	1119	0.1	0.1	0.2
1988	1120	0.1	0.1	0.2
1988	1121	0.1	0.1	0.2
1988	1122	0.1	0.1	0.3
1988	1123	0.2	0.1	0.3
1988	1124	0.2	0	0.3
1988	1125	0.2	0	0.3
	Sum	903.9	695.3	822

Risdalsheia 30-Mar 91

Discharge mm/day 1988-89

		EGIL	KIM	ROLF
1988	1126	0	0	0
1988	1127	0	0	0
1988	1128	0	0	0
1988	1129	0	0	0
1988	1130	0	0	0
1988	1201	0	0	0
1988	1202	0.1	0	0
1988	1203	0.1	0	0
1988	1204	0.1	0	0
1988	1205	0.1	0	0
1988	1206	0.2	0	0
1988	1207	0.2	0	0
1988	1208	0.2	0	0
1988	1209	0.9	0.4	2.6
1988	1210	0.9	0.4	2.6
1988	1211	0.9	0.4	2.6
1988	1212	0.9	0.4	2.6
1988	1213	0.8	0.4	2.6
1988	1214	0.8	0.4	2.7
1988	1215	0.8	0.4	2.7
1988	1216	0.8	0.2	1.1
1988	1217	0.1	0.2	1.1
1988	1218	0.1	0.2	1.1
1988	1219	0.1	0.2	1.1
1988	1220	0.1	0.2	1.2
1988	1221	0.1	0.2	1.2
1988	1222	0.1	0.2	1.2
1988	1223	0.1	0.2	1.2
1988	1224	0.1	0.2	8.5
1988	1225	0.1	0.2	8.5
1988	1226	0	0.2	8.5
1988	1227	0	0.2	8.6
1988	1228	0	0.2	8.6
1988	1229	0	0.2	8.6
1988	1230	0	0.1	0.5
1988	1231	0	0.1	0.5
1989	101	0	0.1	0.7
1989	102	0	0.2	0.7
1989	103	0	0.2	0.7
1989	104	0	0.2	0.7
1989	105	0	0.2	0.7
1989	106	0	0	1.5
1989	107	0	0	1.5
1989	108	0	0	1.6
1989	109	0	0	1.5
1989	110	0	0.1	1.5
1989	111	0	0.1	1.5
1989	112	0	0.1	1.5
1989	113	0	0.1	1.5
1989	114	0	0.1	1.3
1989	115	0	0.1	1.3
1989	116	0	0.1	1.2
1989	117	0	0.1	1.2
1989	118	0	0	1.2
1989	119	0	0	1.2
1989	120	0	0	1.2
1989	121	0.1	0	0.5
1989	122	0.1	0	0.5

Discharge mm/day		EGIL	KIM	ROLF
1989	123	0.1	0	0.5
1989	124	0.1	0.1	0.5
1989	125	0.1	0.1	0.5
1989	126	0.1	0.1	0.5
1989	127	0.2	0.1	0.5
1989	128	0	0	0
1989	129	0	0	0
1989	130	0	0	0
1989	131	0	0	0
1989	201	0	0	0
1989	202	0	0	0
1989	203	0	0	0
1989	204	0	0	3.7
1989	205	0	0	3.7
1989	206	0	0.1	3.7
1989	207	0	0.1	3.8
1989	208	0	0.1	3.8
1989	209	0	0.1	3.8
1989	210	0	0.1	3
1989	211	0	0.1	3
1989	212	0	0.1	3
1989	213	0	0.1	3
1989	214	0	0.1	2.9
1989	215	0	0.2	2.9
1989	216	0.1	0.2	2.9
1989	217	0.1	0.2	4.2
1989	218	0.1	0.2	4.2
1989	219	0.1	0.1	4.2
1989	220	0.1	0.1	4.2
1989	221	0.1	0.1	4.2
1989	222	0.1	0.1	4.2
1989	223	0.1	0.1	4.2
1989	224	0.5	0.5	7.9
1989	225	0.5	0.5	8
1989	226	0.5	0.5	8
1989	227	0.5	0.5	8
1989	228	0.5	0.5	8
1989	301	0.5	0.5	8
1989	302	0.5	0.5	8
1989	303	0.5	0.6	8
1989	304	0.1	0.6	8
1989	305	0.2	0.6	8
1989	306	0.2	0.6	8
1989	307	0.2	0.6	8
1989	308	5.1	0.7	8
1989	309	5.1	0.7	7.9
1989	310	7.6	6.3	8.2
1989	311	7.6	6.3	8.2
1989	312	7.6	6.3	8.2
1989	313	7.6	6.3	8.2
1989	314	7.7	6.3	8.3
1989	315	7.7	6.3	8.3
1989	316	7.7	6.4	8.3
1989	317	2.7	2.4	5.9
1989	318	2.7	2.4	5.9
1989	319	2.7	2.4	5.9
1989	320	2.7	2.4	5.9
1989	321	2.8	2.3	5.8
1989	322	3.1	2.8	3.5
1989	323	3.1	2.8	3.5
1989	324	3.1	2.8	3.5
1989	325	3.1	2.8	3.5

Discharge mm/day		EGIL	KIM	ROLF
1989	326	3.1	2.8	3.5
1989	327	3.1	2.9	3.4
1989	328	3.1	2.9	3.4
1989	329	3.1	2.9	3.4
1989	330	3.1	2.9	3.4
1989	331	1.4	3.9	0.3
1989	401	1.4	3.9	0.3
1989	402	1.4	4	0.3
1989	403	1.5	4	0.2
1989	404	1.5	4	0.2
1989	405	1.5	4	0.2
1989	406	1.5	4	0.2
1989	407	13.6	13.6	14.5
1989	408	13	13.7	14.5
1989	409	13.6	13.7	14.5
1989	410	13.6	13.7	14.5
1989	411	13.6	13.7	14.6
1989	412	13.6	13.7	14.6
1989	413	13.6	10.6	14.6
1989	414	23	18.1	0.5
1989	415	23	18.1	0.5
1989	416	23	18.1	0.5
1989	417	23	18.2	0.5
1989	418	23.1	18.2	0.5
1989	419	23.1	18.2	0.5
1989	420	23.1	18.2	0.5
1989	421	17.3	18.2	0.5
1989	422	17.3	10.7	0.5
1989	423	17.3	10.7	0.5
1989	424	17.3	10.7	0.5
1989	425	17.4	10.7	0.5
1989	426	17.4	10.6	0.5
1989	427	17.4	10.6	0.5
1989	428	12.9	11.2	0
1989	429	12.9	11.2	0
1989	430	12.9	11.2	0
1989	501	12.8	11.3	0
1989	502	12.8	11.3	0
1989	503	12.8	11.3	0
1989	504	12.8	11.3	0
1989	505	12.8	11.3	0
1989	506	0.9	1.8	0
1989	507	0.9	1.8	0
1989	508	0.9	1.8	0
1989	509	0.8	1.9	0
1989	510	0.8	1.9	0
1989	511	0.8	1.8	0
1989	512	4.5	2.8	0.7
1989	513	4.5	2.8	0.7
1989	514	4.5	2.8	0.7
1989	515	4.5	2.8	0.7
1989	516	4.5	2.9	0.8
1989	517	4.5	2.9	0.8
1989	518	4.4	2.9	0.8
1989	519	0	0	0
1989	520	0	0	0
1989	521	0	0	0
1989	522	0	0	0
1989	523	0	0	0
1989	524	0	0	0

Discharge mm/day		EGIL	KIM	ROLF
1989	525	0	0	0
1989	526	0	0	0
1989	527	0	0	0
1989	528	0	0	0
1989	529	0	0	0
1989	530	0	0	0
1989	531	0	0	0
1989	601	0	0	0
1989	602	0	0	0
1989	603	0.4	0	0
1989	604	0.4	0	0
1989	605	0.4	0	0
1989	606	0.4	0	0
1989	607	0.4	0	0
1989	608	0.5	0	0
1989	609	0	0	0
1989	610	0	0	0
1989	611	0	0	0
1989	612	0	0.1	0
1989	613	0	0.1	0
1989	614	0	0.1	0
1989	615	0	0.1	0
1989	616	0	0	0
1989	617	0	0	0
1989	618	0	0	0
1989	619	0	0	0
1989	620	0	0	0
1989	621	0	0	0
1989	622	0	0	0
1989	623	2	0	0.2
1989	624	2	0	0.2
1989	625	2	0	0.2
1989	626	2.1	0.1	0.2
1989	627	2.1	0.1	0.3
1989	628	2.1	0.1	0.3
1989	629	2.1	0.1	0.3
1989	630	0	0.2	0
1989	701	0	0.2	0
1989	702	0	0.2	0
1989	703	0	0.3	0
1989	704	0	0.3	0
1989	705	0	0.3	0
1989	706	0	0.3	0
1989	707	0	0	0
1989	708	0	0	0
1989	709	0	0	0
1989	710	0	0	0
1989	711	0	0	0
1989	712	0	0	0
1989	713	0	0	0
1989	714	0	0	0
1989	715	0	0	0
1989	716	0	0	0
1989	717	0	0	0
1989	718	0	0	0
1989	719	0	0	0
1989	720	0	0	0
1989	721	0	0	0
1989	722	0	0	0
1989	723	0	0	0
1989	724	0	0	0
1989	725	0	0	0

Discharge mm/day		EGIL	KIM	ROLF
1989	726	0	0	0
1989	727	0	0	0
1989	728	0	0	0
1989	729	0.1	0	0
1989	730	0.1	0	0
1989	731	0.1	0	0
1989	801	0.1	0	0
1989	802	0.1	0	0
1989	803	0.1	0	0
1989	804	0.2	0	0
1989	805	0	0	0
1989	806	0	0	0
1989	807	0	0	0
1989	808	0	0	0
1989	809	0	0	0
1989	810	0	0	0
1989	811	7.6	3.7	4.1
1989	812	7.6	3.7	4.1
1989	813	7.6	3.7	4.1
1989	814	7.6	3.7	4.1
1989	815	7.6	3.7	4.1
1989	816	7.7	3.7	4.1
1989	817	7.7	3.7	4.1
1989	818	7.7	3.7	4.1
1989	819	0.3	0.2	0
1989	820	0.3	0.2	0
1989	821	0.3	0.1	0
1989	822	0.4	0.1	0
1989	823	0.4	0.1	0
1989	824	0.4	0.1	0
1989	825	0.4	0.1	0
1989	826	1.5	0.4	0.9
1989	827	1.5	0.4	1
1989	828	1.6	0.4	1
1989	829	1.6	0.4	1
1989	830	1.6	0.5	1
1989	831	1.6	0.5	1
1989	901	1.6	0.5	1
1989	902	0	0.1	0
1989	903	0	0.1	0
1989	904	0	0	0
1989	905	0	0	0
1989	906	0	0	0
1989	907	0	0	0
1989	908	0.4	0.1	0
1989	909	0.4	0.1	0
1989	910	0.4	0.1	0
1989	911	0.4	0.2	0
1989	912	0.4	0.2	0
1989	913	0.6	0.2	0
1989	914	4	2.3	2.5
1989	915	4	2.3	2.6
1989	916	4	2.4	2.6
1989	917	4	2.4	2.6
1989	918	4	2.4	2.6
1989	919	4.1	2.4	2.6
1989	920	4.1	2.4	2.6
1989	921	4.1	2.4	2.6
1989	922	0.4	0.1	0.6
1989	923	0.4	0.1	0.6
1989	924	0.4	0.1	0.6
1989	925	0.4	0.1	0.6

Discharge mm/day		EGIL	KIM	ROLF
1989	926	0.4	0	0.7
1989	927	0.4	0	0.7
1989	928	0.4	0	0.7
1989	929	0.4	0	0.7
1989	930	0.4	0	0
1989	1001	0.4	0	0
1989	1002	0.4	0	0
1989	1003	0.5	0	0
1989	1004	0.5	0	0
1989	1005	0.5	0	0
1989	1006	7.6	2.1	0.9
1989	1007	7.6	2.1	1
1989	1008	7.6	2.1	1
1989	1009	7.6	2.1	1
1989	1010	7.7	2.2	1
1989	1011	7.7	2.2	1
1989	1012	7.7	2.2	1
1989	1013	0.9	1.1	0.7
1989	1014	0.9	1	0.7
1989	1015	1	1	0.7
1989	1016	1	1	0.7
1989	1017	1	1	0.8
1989	1018	1	1	0.8
1989	1019	1	1	0.8
1989	1020	8.2	7.3	7.4
1989	1021	8.2	7.3	7.4
1989	1022	8.2	7.3	7.4
1989	1023	8.2	7.3	7.4
1989	1024	8.3	7.3	7.4
1989	1025	8.3	7.3	7.4
1989	1026	8.3	7.4	7.4
1989	1027	4.4	4.3	5.4
1989	1028	4.4	4.3	5.4
1989	1029	4.5	4.3	5.4
1989	1030	4.5	4.3	5.4
1989	1031	4.5	4.4	5.4
1989	1101	4.5	4.4	5.4
1989	1102	4.5	4.4	5.4
1989	1103	1.5	4.4	5.4
1989	1104	1.5	23.3	25
1989	1105	1.5	23.3	25
1989	1106	1.6	23.3	25
1989	1107	1.6	23.3	25.1
1989	1108	1.6	23.4	25.1
1989	1109	8.1	23.4	25.1
1989	1110	8.1	11.8	10.6
1989	1111	8.2	11.8	10.6
1989	1112	8.2	11.8	10.6
1989	1113	8.2	11.8	10.6
1989	1114	8.2	11.8	10.6
1989	1115	8.2	11.8	10.6
1989	1116	8.2	11.8	10.7
1989	1117	0.2	0.2	0.2
1989	1118	0.1	0.2	0.2
1989	1119	0.1	0.1	0.2
1989	1120	0.1	0.1	0.1
1989	1121	0.1	0.1	0.1
1989	1122	0.1	0.1	0.1
1989	1123	0.1	0.1	0.1
1989	1124	0.1	0.1	0.1

sum winter				
88-11-25	89-05-10	614.7	528.8	520.7
sum summer				
89-05-11	89-11-24	390.2	410.1	405.3
sum year				
88-11-25	89-11-24	1004.9	938.9	926.0

Risdalsheia 30-Mar 91

Discharge mm/day 1989-90

		EGIL	KIM	ROLF
1989	1125	0.1	0.1	0.1
1989	1126	0.1	0.1	0.1
1989	1127	0.1	0.1	0.1
1989	1128	0.1	0.1	0.1
1989	1129	0.1	0.1	0.1
1989	1130	0.1	0.1	0.1
1989	1201	0.1	0.1	0.1
1989	1202	0.1	0.1	0.1
1989	1203	0.1	0.1	0.1
1989	1204	0.1	0.1	0.1
1989	1205	0.1	0.1	0.1
1989	1206	0.1	0.1	0.1
1989	1207	0.1	0.1	0.1
1989	1208	0.1	0.1	0.1
1989	1209	0.1	0.1	0.1
1989	1210	0.1	0.1	0.1
1989	1211	0.1	0.1	0.1
1989	1212	0.1	0.1	0.1
1989	1213	0.1	0.1	0.1
1989	1214	0.2	0.1	0.1
1989	1215	0.2	0.1	0.1
1989	1216	0.2	0.1	0.1
1989	1217	0.2	0.1	0.1
1989	1218	0.2	0.1	0.1
1989	1219	0.2	0.1	8.3
1989	1220	0.2	0.1	8.3
1989	1221	0.2	0.1	8.3
1989	1222	0.2	0.1	8.3
1989	1223	0.2	0.1	8.3
1989	1224	0.2	0.1	8.3
1989	1225	0.2	0.1	8.3
1989	1226	0.2	0.2	8.3
1989	1227	0.2	0.2	8.3
1989	1228	0.2	0.2	8.4
1989	1229	0.2	0.2	8.4
1989	1230	0.1	0.1	0
1989	1231	0.1	0.1	0
1990	101	0.1	0.1	0
1990	102	0.1	0.1	0
1990	103	0.1	0.1	0
1990	104	0.1	0.1	0
1990	105	0.1	0.1	2.5
1990	106	0.1	0.1	2.5
1990	107	0.1	0.1	2.5
1990	108	0.1	0.1	2.5
1990	109	0.1	0.1	2.5
1990	110	0.1	0.1	2.5
1990	111	0.1	0.1	2.5
1990	112	0.1	0	4.4
1990	113	0.1	0	4.4
1990	114	0.1	0	4.4
1990	115	0.1	0	4.4

Discharge mm/day		EGIL	KIM	ROLF
1990	116	0.1	0	4.4
1990	117	0.1	0	4.4
1990	118	0.1	0	4.4
1990	119	0.3	0	18.3
1990	120	0.3	0	18.3
1990	121	0.3	0	18.3
1990	122	0.3	0	18.3
1990	123	0.3	0	18.3
1990	124	0.3	0	18.3
1990	125	0.3	0	18.3
1990	126	0.3	0	18.3
1990	127	0.3	0	18.3
1990	128	0.3	0	18.3
1990	129	0.3	0	18.3
1990	130	0.3	0	18.3
1990	131	0.3	0	18.3
1990	201	0.3	0	18.3
1990	202	0.3	0	18.3
1990	203	10.8	7	8.9
1990	204	10.8	7	8.9
1990	205	10.8	7	8.9
1990	206	10.8	7	8.9
1990	207	10.8	7	8.9
1990	208	10.8	7	8.9
1990	209	10.8	7	8.9
1990	210	3	2.7	5.5
1990	211	3	2.7	5.5
1990	212	3	2.7	5.5
1990	213	3	2.7	5.5
1990	214	3	2.7	5.5
1990	215	3	2.7	5.5
1990	216	7.9	7.2	11
1990	217	7.9	7.2	11
1990	218	7.9	7.2	11
1990	219	7.9	7.2	11
1990	220	7.9	7.2	11
1990	221	7.9	7.2	11
1990	222	7.9	7.2	11
1990	223	7.9	7.2	11
1990	224	8.5	7.8	7.5
1990	225	8.5	7.8	7.5
1990	226	8.5	7.8	7.5
1990	227	8.5	7.8	7.5
1990	228	8.5	7.8	7.5
1990	301	8.5	7.8	7.5
1990	302	1.1	0.9	0.5
1990	303	1.1	0.9	0.5
1990	304	1.1	0.9	0.5
1990	305	1.1	0.9	0.5
1990	306	1.1	0.9	0.5
1990	307	1.1	0.9	0.5
1990	308	1.1	0.9	0.5
1990	309	1.9	1.8	1.2
1990	310	1.9	1.8	1.2
1990	311	1.9	1.8	1.2
1990	312	1.9	1.8	1.2

Discharge mm/day		EGIL	KIM	ROLF
1990	313	1.9	1.8	1.2
1990	314	1.9	1.8	1.2
1990	315	1.9	1.8	1.2
1990	316	1.8	1.4	1.2
1990	317	1.8	1.4	1.2
1990	318	1.8	1.4	1.2
1990	319	1.8	1.4	1.2
1990	320	1.8	1.4	1.2
1990	321	1.8	1.4	1.2
1990	322	1.5	1.8	1.2
1990	323	1.5	1.8	1.2
1990	324	1.5	1.8	1.2
1990	325	1.5	1.8	1.2
1990	326	1.5	1.8	1.2
1990	327	1.5	1.8	1.2
1990	328	1.5	1.8	1.2
1990	329	7.6	9.1	0.2
1990	330	7.6	9.1	0.2
1990	331	7.6	9.1	0.2
1990	401	7.6	9.1	0.2
1990	402	7.6	9.1	0.2
1990	403	7.6	9.1	0.2
1990	404	7.6	9.1	0.2
1990	405	20.3	15.6	0.2
1990	406	20.3	15.6	0.2
1990	407	20.3	15.6	0.2
1990	408	20.3	15.6	0.2
1990	409	20.3	15.6	0.2
1990	410	20.3	15.6	0.2
1990	411	20.3	15.6	0.2
1990	412	5.5	5.6	4.7
1990	413	5.5	5.6	4.7
1990	414	5.5	5.6	4.7
1990	415	5.5	5.6	4.7
1990	416	5.5	5.6	4.7
1990	417	5.5	5.6	4.7
1990	418	5.5	5.6	4.7
1990	419	13.8	19.4	0.2
1990	420	13.8	19.4	0.2
1990	421	13.8	19.4	0.2
1990	422	13.8	19.4	0.2
1990	423	13.8	19.4	0.2
1990	424	13.8	19.4	0.2
1990	425	13.8	19.4	0.2
1990	426	13.8	19.4	0.2
1990	427	1.5	3.2	0
1990	428	1.5	3.2	0
1990	429	1.5	3.2	0
1990	430	1.5	3.2	0
1990	501	1.5	3.2	0
1990	502	1.5	3.2	0
1990	503	1.5	3.2	0
1990	504	0	0	0
1990	505	0	0	0
1990	506	0	0	0
1990	507	0	0	0

Discharge mm/day		EGIL	KIM	ROLF
1990	508	0	0	0
1990	509	0	0	0
1990	510	0	0	0
1990	511	0	0	0
1990	512	0	0	0
1990	513	0	0	0
1990	514	0	0	0
1990	515	0	0	0
1990	516	0	0	0
1990	517	0	0	0
1990	518	0	0	0
1990	519	0	0	0
1990	520	0	0	0
1990	521	0	0	0
1990	522	0	0	0
1990	523	0	0	0
1990	524	0.6	0.2	0
1990	525	0.6	0.2	0
1990	526	0.6	0.2	0
1990	527	0.6	0.2	0
1990	528	0.6	0.2	0
1990	529	0.6	0.2	0
1990	530	0.6	0.2	0
1990	531	0.6	0.2	0
	sum	621.2	606.0	709.8

APPENDIX 7

Appendix 7. Risdalsheia. Precipitation

Precipitation chemistry 1987-88. Units: ueq/l.
EGIL

d ON	d OFF	MM	PH	NA	K	CA	MG	NH4N	NO3N	CL	SULF
871126	880524	335.7	4.07	123.0	6.0	9.0	26.0	53.0	50.0	149.0	107.0
880525	880601	28.9	4.69	7.4	6.7	31.9	6.6	18.6	37.9	4.5	94.2
880602	880630	23.7	4.13	10.0	1.5	4.5	2.7	0.7	28.6	12.1	51.0
880701	880706	95.4	4.11	17.0	1.3	8.5	5.3	53.6	45.7	17.5	89.9
880708	880713	72.8	4.39	20.4	0.5	2.5	4.8	5.0	20.0	20.3	31.8
880714	880721	51.9	4.35	7.4	1.0	2.0	1.8	5.0	8.6	6.8	36.2
880722	880728	85.6	4.35	46.5	1.3	5.0	11.4	26.4	37.1	45.7	41.2
880729	880810	50.0	5.10	67.9	1.3	4.0	14.9	2.9	0.7	71.6	13.1
880811	880817	60.6	4.36	13.5	0.5	4.5	4.6	8.6	16.4	15.5	31.8
880818	880825	133.6	4.18	16.1	3.1	5.5	4.9	46.4	55.0	22.0	56.2
880826	880901	79.3	4.25	18.7	1.5	7.0	6.0	41.4	36.4	22.0	63.6
880902	880908	50.9	4.12	52.2	1.0	7.5	13.7	18.6	35.7	64.3	49.3
880909	880921	37.7	4.88	10.0	0.3	11.0	5.3	4.3	0.7	7.6	23.7
880922	880930	59.0	4.08	42.2	1.0	12.0	11.5	75.0	77.1	48.8	84.2
881001	881006	59.3	4.15	68.7	6.9	27.9	23.9	57.1	74.3	79.0	84.2
881007	881012	57.1	4.58	82.7	3.6	5.0	19.8	7.9	6.4	88.8	30.6
881013	881019	22.3	4.23	7.4	3.1	4.0	5.3	5.7	25.7	8.2	45.6
881020	881103	31.8	4.27	29.1	4.1	8.5	10.7	27.9	35.7	31.6	46.8
881104	881110	26.3	4.03	58.3	2.8	10.5	15.6	150.7	107.9	72.8	119.2
881111	881118	4.1	3.75	93.1	2.0	10.5	24.7	55.0	147.1	119.3	95.5

Precipitation chemistry 1987-88. Units: ueq/l.
KIM

d ON	d OFF	NEDB	PH	NA	K	CA	MG	NH4N	NO3N	CL	SULF
871126	880601	227.0	5.20	117.0	2.0	5.0	27.0	1.0	1.0	136.0	14.0
880602	880630	34.6	5.54	27.0	1.3	2.5	6.2	4.3	0.7	27.9	5.6
880701	880706	63.7	5.15	27.0	1.0	4.0	6.9	0.7	3.6	27.6	4.4
880707	880713	42.6	5.32	27.8	0.3	1.5	5.6	1.4	0.7	26.5	2.5
880714	880721	32.7	5.43	22.6	0.3	2.0	4.9	1.4	0.7	22.6	2.5
880722	880728	61.3	5.53	12.6	0.5	1.0	3.0	1.4	0.7	12.7	1.9
880729	880810	42.6	5.29	57.9	1.3	3.0	12.9	1.4	0.7	60.9	5.6
880811	880817	41.2	5.25	58.7	0.8	4.0	14.1	1.4	0.7	64.6	6.9
880818	880825	105.4	5.14	45.2	0.8	4.0	10.9	0.7	0.7	49.4	8.1
880826	880901	45.0	5.10	23.9	1.3	3.5	6.6	0.7	0.7	28.5	4.4
880902	880908	48.7	5.28	21.8	0.3	5.0	5.2	0.7	0.7	24.0	0.8
880909	880815	1.9	5.14	57.0	1.3	16.5	15.1	0.7	0.7	59.8	13.1
880916	880921	3.6	5.33	93.1	6.9	16.5	25.8	0.7	2.9	105.5	25.0
880922	880930	38.2	4.76	82.7	0.3	8.5	20.1	0.7	0.7	101.0	11.2
881001	881006	79.7	5.10	57.9	1.0	8.0	15.2	1.4	0.7	63.5	10.6
881007	881012	71.3	5.04	47.9	0.3	0.5	9.1	0.7	33.6	29.6	10.6
881013	881019	27.6	5.10	45.7	0.8	1.5	8.8	0.7	0.7	45.1	10.6
881020	881026	32.1	5.04	62.2	1.5	3.0	13.6	0.7	0.7	52.5	5.6
881027	881103	6.8	5.08	93.1	3.6	4.0	21.0	0.7	26.4	31.0	54.9
881104	881110	20.2	5.06	209.2	3.8	14.0	44.4	0.7	0.7	243.6	28.7
881111	881118	2.3	5.16	144.0	2.0	8.0	29.6	0.7	0.7	159.9	17.5

Precipitation chemistry 1987-88. Units: ueq/l.
ROLF

d ON	d OFF	MM	PH	NA	K	CA	MG	NH4N	NO3N	CL	SULF
871203	871229	55.2	4.16	41.3	3.3	15.5	12.8	23.6	43.6	44.6	67.4
871230	871231	113.1	4.46	62.6	2.3	5.0	15.1	13.6	19.3	68.5	36.8
880101	880106	92.5	4.46	62.6	2.3	5.0	15.1	13.6	19.3	68.5	36.8
880107	880113	55.8	4.21	94.8	4.6	11.0	22.0	55.7	61.4	114.8	76.8
880114	880120	158.9	4.11	34.8	3.3	11.0	7.7	88.6	68.6	40.3	107.3
880121	880127	92.0	4.12	35.2	2.0	3.0	7.5	16.4	35.7	38.4	49.9
880128	880413	169.9	4.18	52.2	1.8	3.5	12.0	20.7	28.6	60.1	44.3
880414	880427	86.7	4.26	7.0	1.5	4.0	1.5	41.4	36.4	3.4	45.6
880428	880510	80.1	3.81	16.5	2.3	14.5	5.6	135.0	103.6	12.4	147.9
880511	880524	8.4	4.30	28.7	3.6	33.9	11.3	89.3	99.3	28.5	162.2
880525	880601	28.7	4.69	7.4	6.7	31.9	6.6	18.6	37.9	4.5	94.2
880602	880630	26.8	4.13	10.0	1.5	4.5	2.7	0.7	28.6	12.1	51.0
880701	880706	113.7	4.11	17.0	1.3	8.5	5.3	53.6	45.7	17.5	89.9
880707	880713	60.8	4.39	20.4	0.5	2.5	4.8	5.0	20.0	20.3	31.8
880714	880721	79.0	4.35	7.4	1.0	2.0	1.8	5.0	8.6	6.8	36.2
880722	880728	110.5	4.35	46.5	1.3	5.0	11.4	26.4	37.1	45.7	41.2
880729	880810	32.2	5.10	67.9	1.3	4.0	14.9	2.9	0.7	71.6	13.1
880811	880817	58.4	4.36	13.5	0.5	4.5	4.6	8.6	16.4	15.5	31.8
880818	880825	133.8	4.18	16.1	3.1	5.5	4.9	46.4	55.0	22.0	56.2
880826	880901	85.4	4.25	18.7	1.5	7.0	6.0	41.4	36.4	22.0	63.6
880902	880908	42.0	4.12	52.2	1.0	7.5	13.7	18.6	35.7	64.3	49.3
880909	880921	3.5	4.88	10.0	0.3	11.0	5.3	4.3	0.7	7.6	23.7
880922	880930	54.8	4.08	42.2	1.0	12.0	11.5	75.0	77.1	48.8	84.2
881001	881006	47.5	4.15	68.7	6.9	27.9	23.9	57.1	74.3	79.0	84.2
881007	881012	83.4	4.58	82.7	3.6	5.0	19.8	7.9	6.4	88.8	30.6
881013	881019	14.3	4.23	7.4	3.1	4.0	5.3	5.7	25.7	8.2	45.6
881020	881103	24.8	4.27	29.1	4.1	8.5	10.7	27.9	35.7	31.6	46.8
881104	881110	18.8	4.03	58.3	2.8	10.5	15.6	150.7	107.9	72.8	119.2
881111	881124	3.5	3.75	93.1	2.0	10.5	24.7	55.0	147.1	119.3	95.5
881125	881202	20.1	4.49	11.3	0.3	5.0	3.3	5.7	9.3	11.0	13.7

Precipitation chemistry 1988-89 Units: ueq/l 30-Mar 91

EGIL

	d ON	d OF	MM	PH	NA	K	CA	MG	NH4N	NO3N	CL	SULF
1989	307	309	12.8	4.18	43.9	1.0	7.5	11.5	46.4	48.6	52.7	68.0
1989	309	316	40.1	4.16	79.2	1.5	6.0	18.9	17.1	39.3	93.3	52.4
1989	316	330	42.4	4.27	87.9	6.7	31.9	32.9	1.4	37.1	79.2	98.0
1989	330	406	9.3	4.14	27.0	1.0	13.0	9.1	117.8	96.4	35.0	107.3
1989	406	413	9.7	4.80	15.2	2.6	114.8	19.8	30.2	57.1	16.4	116.7
1989	413	420	50.0	4.46	16.5	0.5	9.5	6.6	10.6	22.1	18.9	24.3
1989	420	427	302.4	4.06	91.0	2.0	4.0	21.0	0.0	15.0	106.0	84.0
1989	420	511	50.1	4.09	19.6	2.0	11.0	7.4	75.9	81.4	28.8	99.8
1989	511	518	32.7	4.71	47.0	38.1	23.5	21.4	0.4	1.4	55.6	117.3
1989	518	602	3.1	5.58	21.3	53.8	38.9	23.9	0.4	7.1	28.2	51.8
1989	602	608	12.4	4.28	7.0	2.3	11.5	5.8	10.1	27.1	9.3	49.3
1989	608	615	1.7	5.06	32.2	4.6	6.0	10.7	65.2	1.4	36.9	36.8
1989	622	629	26.7	4.14	31.8	1.5	10.0	9.9	23.5	47.9	40.9	81.1
1989	706	713	3.9	5.23	72.6	18.4	11.5	20.6	234.7	3.6	56.1	50.5
1989	713	720	1.7	5.35	30.5	6.4	9.0	10.7	52.9	4.3	24.0	33.7
1989	720	728	3.3	3.78	29.1	9.2	45.9	18.1	64.1	17.9	14.7	217.8
1989	728	804	18.2	4.30	47.9	5.9	10.5	14.0	22.8	18.6	43.4	68.6
1989	804	810	5.0	4.23	4.8	2.6	3.5	0.8	13.1	29.3	8.7	58.0
1989	810	818	70.2	5.29	25.7	1.5	4.0	6.6	29.5	34.3	32.7	43.1
1989	818	825	5.6	5.35	37.0	2.3	7.5	9.9	27.9	1.4	37.8	21.2
1989	825	901	16.2	4.27	6.5	1.5	4.5	2.5	24.3	44.3	11.6	54.9
1989	907	913	7.5	4.85	13.5	0.5	3.0	3.3	8.4	1.4	16.4	16.2
1989	913	921	37.5	4.17	20.9	1.5	13.0	6.6	46.1	53.6	24.5	83.6
1989	921	929	8.1	4.09	43.5	1.0	16.5	12.3	25.6	65.7	37.8	97.3
1989	1005	1012	56.3	4.55	8.3	1.3	1.0	2.5	2.1	15.0	11.3	18.1
1989	1012	1019	9.9	4.48	13.5	2.8	8.0	7.4	3.4	29.3	22.0	27.5
1989	1019	1026	51.0	4.19	31.3	2.3	10.5	9.9	58.7	85.7	44.0	59.3
1989	1026	1102	28.5	4.16	49.2	2.0	9.5	14.8	56.9	63.6	60.6	83.0
1989	1102	1108	1.0	4.29	53.1	1.8	5.0	14.8	43.6	67.9	67.4	41.8
1989	1108	1116	52.8	4.33	91.8	2.3	4.0	9.9	20.0	40.0	120.1	38.7

Precipitation chemistry 1989-90 Units: ueq/l 30-Mar 91

KIM-N

	d ON	d OFF	MM	PH	NA	K	CA	MG	NH4N	NO3	CL	SULF
1990	202	209	31.8	4.4	191.4	5.1	9.5	42.8	4.3	7.9	201.7	31.9
1990	209	215	87.6	4.6	137.9	5.9	6.5	35.4	21.4	0.7	149.2	20.0
1990	215	223	164.0	4.4	13.5	0.5	0.5	4.1	0.7	0.7	20.6	1.9
1990	223	301	63.1	4.3	73.5	1.5	2.5	16.5	1.4	0.7	95.3	5.6
1990	301	308	44.3	4.3	81.8	0.8	3.0	16.5	4.3	0.7	88.3	9.4
1990	308	315	59.9	4.3	73.5	0.5	3.5	15.6	2.9	0.7	81.2	9.4
1990	315	321	40.8	4.5	79.2	0.8	4.0	17.3	5.0	6.4	87.2	13.1
1990	321	328	7.0	4.8	74.8	0.5	2.0	15.6	2.1	0.7	83.8	9.4
1990	328	404	10.5	4.3	74.0	0.8	2.5	16.5	0.7	0.7	85.5	10.0
1990	404	411	8.6	3.8	87.4	1.5	4.5	22.2	0.7	0.7	120.2	14.4
1990	411	418	7.0	4.3	73.1	1.0	3.5	17.3	0.7	0.7	90.0	10.6
1990	418	426	4.5	4.0	55.7	0.8	3.5	14.0	2.1	0.7	75.6	10.0
1990	426	503	9.9	4.3	24.4	0.3	0.5	4.9	0.7	0.7	31.6	4.4
1990	503	509	42.0	4.1	50.5	4.3	5.0	11.5	41.4	0.7	61.2	8.7
1990	509	516	3.5	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1990	516	523	2.9	4.3	55.7	4.9	4.5	14.0	17.9	0.7	66.9	8.1
1990	523	530	9.6	4.3	48.3	0.3	3.5	9.9	6.4	0.7	59.5	3.1
1990	516	523	9.6	4.3	10.4	5.4	5.5	4.9	7.9	7.1	11.0	41.8
1990	523	530	4.5	4.2	21.3	1.8	4.0	4.9	0.7	0.7	23.7	51.8
1990	530	607	38.9	4.0	17.0	1.0	7.0	4.9	0.7	36.4	21.2	75.0
1990	607	614	6.7	3.8	28.3	2.6	19.0	9.0	112.1	177.1	36.7	193.0
1990	614	621	36.3	4.0	8.7	0.3	3.0	2.5	57.1	47.8	13.8	117.4
1990	621	628	73.2	4.3	22.6	0.3	2.5	5.8	15.0	25.7	28.8	62.5
1990	628	705	91.7	4.2	27.0	0.5	3.5	6.6	32.1	44.3	35.3	63.1
1990	705	711	59.2	4.3	17.4	0.5	2.0	4.1	12.1	0.7	69.7	5.6
1990	711	725	8.0	6.6	8.3	1.3	2.5	2.5	3.6	0.7	10.7	13.7
1990	725	802	1.9	6.2	38.3	3.3	26.9	14.0	29.3	0.7	16.1	61.8
1990	1103	1109	128.1	5.36	48.7	1.02	1.50	12.35	2.14	1.43	64.86	9.15
1990	1109	1116	68.0	5.50	53.5	1.28	1.50	13.17	2.86	1.43	68.81	7.70
1990	1116	1124	2.9	5.44	66.6	3.33	2.50	13.17	2.86	1.43	78.96	11.23

Precipitation chemistry 1988-89   Units: ueq/l   30-Mar 91

ROLF-N

	d ON	d OFF	MM	pH	NA	K	CA	MG	NH4	NO3N	CL	SULF
1988	1125	1201	20.1	4.49	11.3	0.3	5.0	3.3	5.7	9.3	11.0	13.7
1988	1201	1215	55.7	4.43	20.9	1.3	3.0	4.9	23.6	20.7	21.4	30.0
1988	1215	1223	7.3	4.52	313.2	7.7	20.5	73.2	10.0	13.6	318.7	67.4
1988	1223	1231	9.2	4.43	43.1	2.3	9.5	10.7	10.7	15.0	50.8	31.2
1989	101	102	4.1	3.61	287.1	9.0	23.5	65.8	107.9	192.1	306.0	231.7
1989	102	109	11.8	4.23	146.2	3.6	7.0	29.6	37.9	46.4	165.0	76.1
1989	109	116	9.9	4.15	153.6	3.6	8.5	32.1	17.1	32.9	173.4	69.3
1989	116	123	4.1	3.53	274.1	11.8	21.0	64.2	249.3	292.9	290.5	348.2
1989	123	130	2.2	3.57	526.4	25.3	43.4	141.6	232.9	317.1	669.8	345.1
1989	206	213	26.4	4.34	110.1	2.8	9.0	25.5	19.8	35.0	115.3	64.9
1989	213	220	8.9	4.02	221.9	5.1	16.5	50.2	22.4	60.0	275.8	101.7
1989	220	227	43.6	4.20	143.6	5.4	14.5	32.9	21.8	53.6	159.0	69.3
1989	227	301	76.1	4.22	59.2	2.6	6.0	14.0	21.1	43.6	64.6	62.4
1989	301	309	17.8	3.67	40.5	2.6	12.0	10.7	127.9	167.1	56.1	172.2
1989	309	316	64.6	4.18	43.9	1.0	7.5	11.5	46.4	48.6	52.7	68.0
1989	316	330	43.6	4.16	79.2	1.5	6.0	18.9	17.1	39.3	93.3	52.4
1989	330	406	1.9	4.27	87.9	6.7	31.9	32.9	1.4	37.1	79.2	98.0
1989	406	413	93.0	4.14	27.0	1.0	13.0	9.1	117.8	96.4	35.0	107.3
1989	413	420	5.7	4.80	15.2	2.6	114.8	19.8	30.2	57.1	16.4	116.7
1989	420	427	10.2	4.46	16.5	0.5	9.5	6.6	10.6	22.1	18.9	24.3
1989	427	505	0.6	4.09	19.6	2.0	11.0	7.4	75.9	81.4	28.8	99.8
1989	505	511	0.3	4.09	19.6	2.0	11.0	7.4	75.9	81.4	28.8	99.8
1989	511	518	22.0	4.71	47.0	38.1	23.5	21.4	0.4	1.4	55.6	117.3
1989	518	602	2.5	5.58	21.3	53.8	38.9	23.9	0.4	7.1	28.2	51.8
1989	602	608	12.1	4.28	7.0	2.3	11.5	5.8	10.1	27.1	9.3	49.3
1989	608	615	1.6	5.06	32.2	4.6	6.0	10.7	65.2	1.4	36.9	36.8
1989	622	629	19.7	4.14	31.8	1.5	10.0	9.9	23.5	47.9	40.9	81.1
1989	706	713	4.1	5.23	72.6	18.4	11.5	20.6	234.7	3.6	56.1	50.5
1989	713	720	2.1	5.35	30.5	6.4	9.0	10.7	52.9	4.3	24.0	33.7
1989	720	728	3.5	3.78	29.1	9.2	45.9	18.1	64.1	17.9	14.7	217.8
1989	728	804	7.3	4.30	47.9	5.9	10.5	14.0	22.8	18.6	43.4	68.6
1989	804	810	15.0	4.23	4.8	2.6	3.5	0.8	13.1	29.3	8.7	58.0
1989	810	818	62.4	5.29	25.7	1.5	4.0	6.6	29.5	34.3	32.7	43.1
1989	818	825	6.1	5.35	37.0	2.3	7.5	9.9	27.9	1.4	37.8	21.2
1989	825	901	16.2	4.27	6.5	1.5	4.5	2.5	24.3	44.3	11.6	54.9
1989	907	913	8.0	4.85	13.5	0.5	3.0	3.3	8.4	1.4	16.4	16.2
1989	913	921	38.9	4.17	20.9	1.5	13.0	6.6	46.1	53.6	24.5	83.6
1989	921	929	8.1	4.09	43.5	1.0	16.5	12.3	25.6	65.7	37.8	97.3
1989	1005	1012	66.6	4.55	8.3	1.3	1.0	2.5	2.1	15.0	11.3	18.1
1989	1012	1019	12.4	4.48	13.5	2.8	8.0	7.4	3.4	29.3	22.0	27.5
1989	1019	1026	53.5	4.19	31.3	2.3	10.5	9.9	58.7	85.7	44.0	59.3
1989	1026	1102	51.3	4.16	49.2	2.0	9.5	14.8	56.9	63.6	60.6	83.0
1989	1102	1108	111.8	4.29	53.1	1.8	5.0	14.8	43.6	67.9	67.4	48.7
1989	1108	1116	37.9	4.33	91.8	2.3	4.0	9.9	20.0	40.0	120.1	51.2

Precipitation chemistry 1989-90. Units:ueq/l 30-Mar 91

EGIL-N

	d ON	d OFF	MM	PH	NA	K	CA	MG	NH4N	NO3N	CL	SULF
1990	104	111	0.0	4.40	215.8	4.1	11.0	49.4	7.1	22.1	251.4	58.1
1990	111	118	0.0	4.56	57.9	1.0	3.5	13.2	8.6	16.4	70.8	27.5
1990	118	125	0.0	4.42	98.7	2.3	6.0	21.4	32.1	41.4	102.1	48.7
1990	202	209	65.7	4.33	108.8	2.8	6.0	24.7	20.0	33.6	116.2	48.1
1990	209	215	16.0	4.29	136.6	3.6	8.5	30.4	30.0	41.4	122.7	70.0
1990	215	223	51.9	4.34	49.2	1.8	2.5	11.5	16.4	27.8	68.0	45.6
1990	223	301	44.1	4.48	65.3	2.0	21.0	1.6	17.9	25.7	82.4	53.7
1990	301	308	9.9	4.76	204.0	2.8	10.5	43.6	3.6	7.1	244.3	41.2
1990	308	315	15.9	4.31	195.8	3.6	14.5	43.6	99.2	87.8	216.7	101.2
1990	315	321	13.3	3.77	130.9	2.8	20.5	31.3	114.2	133.5	157.4	176.1
1990	321	328	10.4	4.30	370.2	6.9	20.5	89.7	37.1	32.1	480.7	103.1
1990	328	404	1.0	4.04	52.6	1.8	10.0	12.3	110.0	99.2	59.8	128.0
1990	404	411	11.2	4.26	77.0	1.8	6.0	19.7	10.0	41.4	93.9	66.2
1990	411	418	34.2	4.13	27.4	1.0	4.5	8.2	100.7	88.5	39.8	86.8
1990	418	426	3.5	4.06	47.9	5.4	54.4	23.9	221.3	134.9	40.9	262.3
1990	426	503	0.2	4.33	32.6	8.2	26.9	16.5	120.7	66.4	30.2	126.8
1990	503	509	291.8	4.34	147.0	3.1	6.0	33.7	0.0	15.0	171.0	89.5
1990	509	516	9.9	4.34	28.7	10.0	20.0	14.0	42.1	46.4	31.9	138.0
1990	516	523	5.1	4.32	10.4	5.4	5.5	4.9	7.9	7.1	11.0	41.8
1990	523	530	6.7	4.18	21.3	1.8	4.0	4.9	0.7	0.7	23.7	51.8

Precipitation chemistry 1989-90. Units: ueq/l 30-Mar 91

KIM-N

	d ON	d OFF	MM	PH	NA	K	CA	MG	NH4N	NO3	CL	SULF
1990	202	209	42.9	5.44	191.4	5.1	9.5	42.8	4.3	7.9	201.7	31.9
1990	209	215	13.8	5.51	137.9	5.9	6.5	35.4	21.4	0.7	149.2	20.0
1990	215	223	49.4	5.47	13.5	0.5	0.5	4.1	0.7	0.7	20.6	1.9
1990	223	301	40.6	5.39	73.5	1.5	2.5	16.5	1.4	0.7	95.3	5.6
1990	301	308	10.0	5.45	81.8	0.8	3.0	16.5	4.3	0.7	88.3	9.4
1990	308	315	13.2	5.53	73.5	0.5	3.5	15.6	2.9	0.7	81.2	9.4
1990	315	321	12.2	5.34	79.2	0.8	4.0	17.3	5.0	6.4	87.2	13.1
1990	321	328	10.8	5.48	74.8	0.5	2.0	15.6	2.1	0.7	83.8	9.4
1990	328	404	64.3	5.17	74.0	0.8	2.5	16.5	0.7	0.7	85.5	10.0
1990	404	411	103.5	5.15	87.4	1.5	4.5	22.2	0.7	0.7	120.2	14.4
1990	411	418	39.1	5.32	73.1	1.0	3.5	17.3	0.7	0.7	90.0	10.6
1990	418	426	164.7	4.97	55.7	0.8	3.5	14.0	2.1	0.7	75.6	10.0
1990	426	503	19.3	5.54	24.4	0.3	0.5	4.9	0.7	0.7	31.6	4.4
1990	503	509	0.0	5.40	50.5	4.3	5.0	11.5	41.4	0.7	61.2	8.7
1990	509	516	9.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1990	516	523	2.9	5.60	55.7	4.9	4.5	14.0	17.9	0.7	66.9	8.1
1990	523	530	10.1	5.40	48.3	0.3	3.5	9.9	6.4	0.7	59.5	3.1

Precipitation chemistry 1989-90. Units: ueq/l 30-Mar 91

ROLF-N

	d ON	d OFF	MM	pH	NA	K	CA	MG	NH4	NO3N	CL	SULF
1989	1214	1218	36.3	4.53	118.8	2.8	5.5	28.0	2.5	14.3	143.9	28.1
1989	1218	1227	56.1	4.23	138.3	3.3	7.0	32.1	16.9	33.6	128.4	54.3
1989	1227	104	3.8	3.59	138.8	7.2	14.0	33.7	99.3	122.1	139.1	277.9
1990	104	111	20.7	4.40	215.8	4.1	11.0	49.4	7.1	22.1	251.4	58.1
1990	111	118	31.8	4.56	57.9	1.0	3.5	13.2	8.6	16.4	70.8	27.5
1990	118	202	251.6	4.42	98.7	2.3	6.0	21.4	32.1	41.4	102.1	48.7
1990	202	209	63.1	4.33	108.8	2.8	6.0	24.7	20.0	33.6	116.2	48.1
1990	209	215	44.3	4.29	136.6	3.6	8.5	30.4	30.0	41.4	122.7	70.0
1990	215	223	59.9	4.34	49.2	1.8	2.5	11.5	16.4	27.8	68.0	45.6
1990	223	301	40.8	4.48	65.3	2.0	21.0	1.6	17.9	25.7	82.4	53.7
1990	301	308	7.0	4.76	204.0	2.8	10.5	43.6	3.6	7.1	244.3	41.2
1990	308	315	10.5	4.31	195.8	3.6	14.5	43.6	99.2	87.8	216.7	101.2
1990	315	321	8.6	3.77	130.9	2.8	20.5	31.3	114.2	133.5	157.4	176.1
1990	321	328	7.0	4.30	370.2	6.9	20.5	89.7	37.1	32.1	480.7	103.1
1990	328	404	4.5	4.04	52.6	1.8	10.0	12.3	110.0	99.2	59.8	128.0
1990	404	411	9.9	4.26	77.0	1.8	6.0	19.7	10.0	41.4	93.9	66.2
1990	411	418	42.0	4.13	27.4	1.0	4.5	8.2	100.7	88.5	39.8	86.8
1990	418	426	3.5	4.06	47.9	5.4	54.4	23.9	221.3	134.9	40.9	262.3
1990	426	503	2.9	4.33	32.6	8.2	26.9	16.5	120.7	66.4	30.2	126.8
1990	503	509	0.0									
1990	509	516	9.6	4.34	28.7	10.0	20.0	14.0	42.1	46.4	31.9	138.0
1990	516	523	9.6	4.32	10.4	5.4	5.5	4.9	7.9	7.1	11.0	41.8
1990	523	530	4.5	4.18	21.3	1.8	4.0	4.9	0.7	0.7	23.7	51.8

APPENDIX 8

Appendix 8. Risdalsheia. Runoff chemistry

EGIL runoff chemistry 1987-88 Units: ueq/l; TOC mgC/l.

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	SUM +	SUM -	A-	TOC	c.d.
1988	113	4.07	85.1	18.0	25.5	117.5	9.0	17.0	16.8	43.2	115.6	101.9	288.8	260.8	28.0	9.02	3.11
1988	211	4.12	75.9	17.5	26.3	116.1	9.2	20.0	27.9	50.7	115.6	112.3	292.9	278.7	14.3	7.07	2.02
1988	302	4.10	79.4	21.0	26.3	108.3	6.1	20.3	13.1	39.3	126.9	112.3	274.6	278.5	-3.9	7.42	-0.52
1988	408	4.18	66.1	18.5	24.7	90.5	10.8	11.4	49.3	48.6	98.7	118.6	271.1	265.8	5.3	5.66	0.94
1988	414	4.36	43.7	11.5	15.6	68.7	7.9	10.7	26.9	37.1	67.7	74.9	185.0	179.7	5.3	6.27	0.84
1988	422	4.26	55.0	11.0	14.0	60.5	6.7	9.9	17.5	27.9	53.6	66.6	174.4	148.0	26.4	7.74	3.42
1988	428	4.36	43.7	8.5	9.1	44.4	5.4	8.8	10.1	23.2	36.7	41.6	129.9	101.5	28.4	7.56	3.76
1988	504	4.47	33.9	8.0	9.1	46.1	5.9	8.6	26.0	20.4	36.7	41.6	137.5	98.6	38.9	9.32	4.17
1988	511	4.26	55.0	11.0	10.7	50.0	7.2	8.2	5.0	14.2	47.9	47.8	147.0	110.0	37.0	11.30	3.28
1988	602	4.00	100.0	31.9	42.8	94.4	9.2	24.1	72.9	106.4	62.0	187.2	375.3	355.7	19.6	12.20	1.61
1988	610	4.19	64.6	19.5	24.7	73.5	8.4	14.4	55.7	39.6	47.9	133.1	260.8	220.7	40.1	12.30	3.26
1988	707	4.21	61.7	15.0	18.1	49.6	5.9	10.5	23.7	15.0	28.2	112.3	184.4	155.5	28.9	12.00	2.41
1988	714	4.31	49.0	10.5	11.5	37.8	2.8	9.8	20.4	3.5	22.6	54.1	141.8	80.1	61.7	16.10	3.83
1988	722	4.28	52.5	11.5	12.3	38.3	2.3	8.6	21.4	4.5	22.6	54.1	146.8	81.1	65.7	17.79	3.69
1988	729	4.02	95.5	20.5	23.9	73.5	2.6	8.5	14.8	62.9	81.8	74.9	239.2	219.5	19.7	8.36	2.35
1988	804	4.14	72.4	11.5	14.0	59.6	1.5	8.5	9.7	8.4	84.6	29.1	177.3	122.1	55.2	15.98	3.45
1988	826	4.07	85.1	14.0	17.3	48.7	3.1	10.6	7.3	22.1	36.7	83.2	186.0	142.0	44.0	11.75	3.75
1988	902	4.14	72.4	13.5	14.8	36.5	3.1	5.8	11.8	25.0	28.2	74.9	157.9	128.1	29.8	8.93	3.34
1988	909	4.15	70.8	13.0	16.5	51.3	3.3	8.4	12.6	20.0	73.3	56.2	175.9	149.5	26.4	10.80	2.44
1988	929	4.14	72.4	17.5	20.6	68.3	4.1	18.3	12.9	17.9	87.4	95.7	214.1	201.0	13.1	12.06	1.09
1988	930	4.07	85.1	18.5	22.2	68.3	4.4	17.1	20.8	21.1	81.8	95.7	236.3	198.5	37.8	12.11	3.12
1988	1007	4.07	85.1	21.5	23.0	69.2	7.7	12.8	20.4	32.9	107.2	79.0	239.7	219.1	20.6	9.48	2.18
1988	1013	4.20	63.1	11.0	13.2	76.6	5.6	6.1	18.2	11.3	104.3	47.8	193.7	163.5	30.3	7.62	3.97
1988	1027	4.24	57.5	9.5	12.3	63.9	4.6	4.3	27.4	42.5	53.6	68.6	179.7	164.7	14.9	9.08	1.64
1988	1111	3.98	104.7	29.4	37.0	100.1	6.7	14.9	60.7	107.1	107.2	153.9	353.5	368.2	-14.7	6.95	-2.12

KIM runoff chemistry 1987-88 Units: ueq/l; TOC mgC/l.

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	sum +	sum -	A-	TOC	c.d.	SIO
1988	113	4.25	56.2	7.5	11.5	71.3	5.6	0.2	5.0	5.6	70.8	33.3	157.4	109.7	47.7	14.30	3.34	3.3
1988	211	4.19	64.6	10.0	19.8	97.9	6.7	13.1	11.3	18.9	101.9	74.9	223.2	195.7	27.5	11.10	2.48	3.3
1988	302	4.17	67.6	10.0	18.9	87.9	4.4	10.1	11.8	11.4	135.8	54.1	210.6	201.3	9.3	10.38	0.90	6.8
1988	324	4.16	69.2	16.0	27.2	114.0	9.5	13.2	19.6	27.1	147.2	72.8	268.5	247.1	21.4	9.50	2.25	6.0
1988	408	4.10	79.4	13.5	25.5	95.7	14.1	14.5	24.8	16.8	169.8	77.0	267.5	263.5	3.9	11.70	0.34	2.6
1988	414	4.35	44.7	5.5	9.1	65.3	6.4	8.4	9.5	7.9	56.6	39.5	148.8	104.0	44.7	11.60	3.85	1.6
1988	422	4.42	38.0	6.0	9.1	61.8	5.9	8.8	10.8	11.5	36.8	39.5	140.3	87.8	52.5	12.40	4.23	1.6
1988	428	4.50	31.6	4.0	5.8	45.2	4.9	7.5	8.6	5.8	22.6	27.0	107.6	55.5	52.1	12.00	4.34	1.2
1988	503	4.51	30.9	4.0	4.9	39.6	3.8	5.5	10.9	7.9	14.2	27.0	99.7	49.0	50.6	10.60	4.78	1.0
1988	511	4.66	21.9	3.0	4.9	34.8	3.6	4.2	8.8	5.3	11.3	22.9	81.2	39.5	41.7	9.65	4.32	0.9
1988	602	4.82	15.1	7.5	8.2	36.5	4.4	4.8	35.7	12.9	17.0	43.7	112.3	73.5	38.7	8.74	4.43	1.1
1988	610	4.32	47.9	9.0	14.8	65.7	4.1	10.4	16.4	8.5	45.3	60.3	168.3	114.1	54.2	12.60	4.30	3.5
1988	707	4.14	72.4	12.5	18.9	71.3	5.9	13.2	16.3	7.2	56.6	70.7	210.6	134.5	76.0	18.60	4.09	3.6
1988	714	4.27	53.7	9.0	12.3	54.8	3.1	11.9	12.9	1.6	45.3	31.2	157.7	78.1	79.7	16.50	4.83	2.5
1988	722	4.32	47.9	7.5	11.5	49.6	2.8	8.3	18.6	0.8	39.6	18.7	146.2	59.1	87.1	21.11	4.13	2.1
1988	729	4.13	74.1	7.5	11.5	47.4	3.3	6.8	2.1	2.4	42.5	25.0	152.8	69.8	82.9	22.46	3.69	1.7
1988	804	4.22	60.3	7.0	11.5	49.6	3.1	11.0	0.7	0.7	65.1	10.4	143.1	76.2	66.9	15.73	4.26	2.4
1988	826	4.16	69.2	7.0	10.7	49.2	2.8	8.7	1.4	0.4	59.4	16.6	149.0	76.4	72.5	16.96	4.28	1.3
1988	902	4.15	70.8	9.0	15.6	51.3	3.8	10.7	4.0	1.0	50.9	22.9	165.3	74.8	90.5	23.31	3.88	1.5
1988	909	4.27	53.7	8.5	9.9	51.8	5.4	8.6	2.0	1.7	56.6	6.2	139.8	64.6	75.2	19.89	3.78	2.9
1988	929	4.14	72.4	11.5	18.1	67.9	3.3	14.1	0.9	3.1	101.9	52.0	188.2	157.0	31.3	12.20	2.56	3.5
1988	930	4.17	67.6	15.5	19.8	71.3	4.1	15.0	0.9	3.8	96.2	58.2	194.2	158.2	35.9	11.93	3.01	3.4
1988	1007	4.16	69.2	9.0	11.5	57.4	4.1	7.6	2.1	0.7	79.2	35.4	160.9	115.3	45.6	13.98	3.26	1.1
1988	1013	4.19	64.6	6.0	9.1	50.0	4.9	4.2	3.6	0.9	70.8	20.8	142.3	92.4	49.9	14.00	3.57	1.1
1988	1027	4.09	81.3	9.0	15.6	70.9	4.9	8.5	6.0	5.1	101.9	37.4	196.2	144.5	51.7	18.46	2.80	1.6
1988	1111	4.01	97.7	15.5	26.3	88.3	4.6	13.1	12.3	11.4	178.3	54.1	257.8	243.7	14.1	13.59	1.04	2.0

ROLF runoff chemistry 1987-88 Units: ueq/l; TOC mgC/l.

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	SUM +	SUM -	A-	TOC	c.d.	SIO2
1988	113	4.25	56.2	7.0	10.7	107.4	2.6	4.8	5.4	12.9	90.6	52.0	194.2	155.4	38.7	9.68	4.00	1
1988	128	4.12	75.9	12.0	18.9	130.1	4.1	8.1	7.1	37.1	93.4	106.1	256.2	236.6	19.6	7.26	2.69	0.8
1988	211	4.06	87.1	15.0	26.3	158.8	5.6	8.3	12.6	32.9	198.1	83.2	313.7	314.2	-0.5	5.46	-0.09	0.5
1988	302	4.22	60.3	9.5	16.5	112.2	2.8	5.4	14.1	17.5	133.0	70.7	220.8	221.2	-0.4	6.74	-0.07	1.1
1988	324	4.21	61.7	9.5	13.2	110.1	7.4	4.2	10.6	9.9	113.2	49.9	216.6	173.0	43.6	12.8	3.40	2.1
1988	408	4.13	74.1	12.5	21.4	100.1	7.2	6.4	28.8	51.8	90.6	101.9	250.4	244.3	6.1	6.34	0.97	0.6
1988	408	4.26	55.0	8.5	12.3	73.5	5.6	3.7	23.6	34.3	67.9	66.6	182.3	168.8	13.5	5.98	2.26	0.4
1988	414	4.33	46.8	6.5	10.7	74.8	5.4	4.3	22.4	20.7	62.3	64.5	170.8	147.5	23.4	7.85	2.98	0.8
1988	422	4.38	41.7	5.5	7.4	50.5	4.9	3.8	15.4	26.1	28.3	47.8	129.1	102.2	26.9	7.44	3.62	0.3
1988	428	4.54	28.8	3.5	4.1	35.7	3.6	3.7	9.9	8.9	19.8	27.0	89.3	55.7	33.6	7.85	4.27	0.4
1988	504	4.28	52.5	7.5	11.5	55.2	6.7	4.7	20.2	35.7	25.5	60.3	158.3	121.5	36.8	8.8	4.18	0.6
1988	511	4.70	20.0	9.0	9.1	52.6	6.9	6.4	17.6	25.7	28.3	54.1	121.5	108.1	13.4	9.73	1.38	0.7
1988	602	3.89	128.8	32.4	54.3	119.2	4.4	24.8	9.1	45.4	36.8	257.9	373.1	340.1	33.0	11.4	2.89	3.5
1988	610	4.02	95.5	21.0	34.6	96.1	3.1	11.8	25.7	36.8	36.8	164.3	287.7	237.9	49.8	11.8	4.22	2.6
1988	707	3.88	131.8	22.0	37.0	94.8	8.2	16.7	2.0	1.1	59.4	199.7	312.5	260.3	52.3	19.6	2.67	3.5
1988	722	4.18	66.1	11.0	15.6	59.6	5.6	9.6	15.1	2.1	42.5	33.3	182.6	77.9	104.7	26.59	3.94	2.6
1988	729	3.91	123.0	22.0	31.3	88.7	2.3	7.1	8.5	26.1	144.3	66.6	282.9	237.0	45.9	13.45	3.42	1.4
1988	804	4.02	95.5	14.5	23.0	80.5	2.0	11.3	14.6	1.9	155.7	25.0	241.5	182.5	58.9	15.23	3.87	2.3
1988	826	4.02	95.5	15.0	23.0	74.0	1.5	7.2	15.4	40.0	39.6	114.4	231.6	194.0	37.6	11.57	3.25	0.8
1988	902	4.10	79.4	10.0	14.0	53.9	1.0	4.6	4.6	10.9	39.6	74.9	167.5	125.4	42.2	12.13	3.48	0.7
1988	909	4.09	81.3	11.0	15.6	62.2	1.0	7.6	6.7	4.4	76.4	49.9	185.4	130.7	54.8	17.77	3.08	1.4
1988	929	3.95	112.2	21.5	36.2	100.5	1.0	18.7	0.6	2.1	158.5	118.6	290.7	279.2	11.5	13.45	0.86	3.7
1988	930	3.94	114.8	22.0	37.9	103.5	1.0	19.5	0.6	0.1	147.2	122.7	299.3	270.0	29.3	11.98	2.45	3.5
1988	1007	4.02	95.5	23.0	35.4	105.3	1.5	18.6	25.9	6.8	133.0	126.9	305.1	266.7	38.4	12.12	3.17	4
1988	1013	4.08	83.2	10.5	14.8	67.0	1.3	4.6	0.9	4.6	99.1	49.9	182.2	153.5	28.7	9.04	3.17	0.5
1988	1027	3.98	104.7	15.5	26.3	96.1	1.3	11.5	1.6	25.0	104.7	87.4	257.0	217.1	39.9	16.63	2.40	2.1
1988	1111	3.85	141.3	31.4	55.1	132.2	1.5	26.1	2.4	42.1	226.4	137.3	390.1	405.8	-15.7	9.61	-1.63	2.5
1988	1229	4.14	72.4	9.5	16.5	80.0	2.3	7.8	2.4	5.4	93.4	58.2	191.0	157.1	33.9	8.19	4.14	1.7

EGIL runoff chemistry 1989 Units: ueq/l; ugAl/l; mgC/l; mgSiO2/l.

	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	Sum+	Sum-	A-	TOC	SiO2	RAl	ILAl
1988	1111	3.98	104.7	29.4	37.0	100.1	6.7	14.9	60.7	107.1	107.2	153.9	353.5	368.2	-14.7	6.95	1.2	217	68
1988	1229	4.15	70.8	21.0	18.1	81.3	9.0	10.9	17.4	30.0	87.4	74.9	228.4	192.3	36.1	9.96	3.8	231	122
1989	302	4.32	47.9	21.5	29.6	116.1	11.3	14.9	74.3	33.9	121.3	120.6	315.5	275.8	39.7	9.72	6.2	285	136
1989	309	3.86	138.0	59.9	84.8	252.3	30.5	32.6	152.1	164.3	251.0	282.9	750.2	698.1	52.0	14.86	4.6	442	116
1989	330	4.11	77.6	19.5	26.3	106.1	10.8	10.9	37.1	30.4	135.4	126.9	288.4	292.6	-4.2	8.20	1.5	201	92
1989	413	4.10	79.4	19.5	25.5	100.9	9.5	13.9	32.7	45.0	115.6	118.6	281.4	279.2	2.2	9.48	2.0	237	98
1989	428	4.45	35.5	5.5	4.9	30.0	2.8	12.3	6.8	2.9	25.4	31.2	97.8	59.4	38.4	9.76	0.9	206	83
1989	518	4.28	52.5	12.0	14.0	44.4	2.8	6.8	21.9	26.1	33.8	68.6	154.4	128.6	25.8	0.64	1.3	159	91
1989	608	4.06	87.1	24.5	30.5	66.1	5.6	15.8	35.0	75.4	45.1	114.4	264.6	234.9	29.7	12.64	3.0	279	121
1989	629	3.97	107.2	23.0	32.9	61.8	6.9	13.7	25.6	58.6	73.3	124.8	271.1	256.7	14.4	8.57	2.2	216	79
1989	818	4.00	100.0	18.5	23.0	60.5	2.8	17.7	12.1	16.4	47.9	124.8	234.6	189.2	45.4	23.10	3.3	327	150
1989	901	3.99	102.3	18.0	23.0	55.7	1.3	14.4	20.2	44.6	56.4	93.6	234.9	194.6	40.3	12.40	2.9	295	151
1989	921	4.03	93.3	17.0	21.4	61.3	1.0	17.1	10.1	8.4	62.0	104.0	221.2	174.4	46.8	13.00	4.7	357	186
1989	929	3.96	109.6	20.0	24.7	70.0	1.5	19.1	3.4	12.8	79.0	106.1	248.4	197.8	50.6	11.70	6.0	377	186
1989	1019	4.09	81.3	14.0	18.1	55.7	1.5	12.9	3.1	7.0	53.6	74.9	186.5	135.5	51.1	11.40	4.6	338	209

KIM runoff chemistry 1989

1988	1111	4.01	97.7	15.5	26.3	88.3	4.6	13.1	12.3	11.4	177.7	54.1	257.8	243.1	14.7	13.59	2.0	263	132
1988	1229	4.26	55.0	16.0	14.0	74.4	7.9	11.0	4.1	4.6	107.2	29.1	182.3	140.9	41.5	10.41	3.8	240	130
1989	302	4.14	72.4	10.0	19.8	97.9	6.4	15.6	6.0	11.9	135.4	37.4	228.1	184.7	43.4	9.14	5.9	278	122
1989	309	3.95	112.2	19.5	34.6	130.1	18.2	19.1	37.1	29.3	163.6	101.9	370.7	294.8	75.9	22.20	5.5	415	224
1989	330	4.16	69.2	9.0	14.8	90.5	9.0	11.8	7.2	5.0	101.5	43.7	211.4	150.2	61.2	13.89	3.1	304	186
1989	413	4.28	52.5	5.0	7.4	56.1	6.1	6.5	5.1	4.9	64.9	31.2	138.8	101.0	37.8	13.70	1.1	200	135
1989	428	4.30	50.1	5.0	8.2	50.9	6.7	5.9	4.2	1.6	64.9	18.7	131.0	85.2	45.9	14.10	1.4	189	130
1989	518	4.34	45.7	5.5	9.1	55.7	4.9	8.3	7.6	2.4	59.2	41.6	136.7	103.2	33.4	14.20	1.8	235	152
1989	629	4.02	95.5	20.5	32.1	96.1	7.4	23.0	7.6	77.1	67.7	104.0	282.3	248.8	33.4	12.50	4.0	373	143
1989	818	4.02	95.5	13.0	18.9	101.4	4.4	20.0	2.1	3.1	107.2	70.7	255.2	181.0	74.2	26.80	4.7	400	200
1989	901	4.10	79.4	9.0	15.6	89.6	1.5	16.7	0.9	7.2	107.2	45.8	212.8	160.1	52.7	130.00	4.4	358	191
1989	921	4.10	79.4	9.0	14.0	89.6	2.0	15.4	1.9	1.0	112.8	22.9	211.4	136.7	74.7	15.90	4.9	380	226
1989	929	4.12	75.9	11.0	16.5	94.0	5.4	15.7	8.5	1.1	124.1	16.6	226.8	141.8	85.0	16.30	5.6	409	252
1989	1019	4.09	81.3	15.5	20.6	95.7	3.3	16.6	1.4	3.0	121.3	49.9	234.4	174.2	60.2	14.40	5.1	395	229

ROLF runoff chemistry 1989

1988	1111	3.85	141.3	31.4	55.1	132.2	1.5	26.1	2.4	42.1	225.6	137.3	390.1	405.0	-14.9	9.61	2.5	349	88
1988	1229	4.14	72.4	9.5	16.5	80.0	2.3	7.8	2.4	5.4	93.1	58.2	191.0	156.7	34.2	8.19	1.7	177	99
1989	216	3.76	173.8	56.4	105.3	278.4	8.4	88.3	2.4	35.0	535.8	164.3	713.0	735.1	-22.1	4.88	2.6	950	67
1989	302	3.99	102.3	20.5	40.3	185.7	4.9	16.8	4.4	36.8	203.0	110.2	374.9	350.1	24.8	5.50	1.0	235	67
1989	309	4.15	70.8	12.5	18.1	100.5	2.8	8.1	7.5	34.3	79.0	89.4	220.3	202.7	17.6	5.88	0.8	142	61
1989	330	4.17	67.6	12.0	21.4	120.5	4.1	8.6	10.3	22.1	141.0	79.0	244.5	242.2	2.3	6.41	0.8	151	65
1989	413	4.06	87.1	16.0	27.2	119.2	4.6	10.3	11.9	77.9	90.2	118.6	276.2	286.7	-10.4	5.86	0.8	164	61
1989	428	4.15	70.8	11.0	17.3	118.8	3.3	10.1	2.7	2.4	110.0	93.6	234.0	205.9	28.0	11.40	2.1	209	108
1989	518	3.97	107.2	21.5	37.9	146.2	2.3	17.8	1.5	27.1	110.0	201.8	334.2	338.9	-4.7	10.91	3.1	268	90
1989	608	4.00	100.0	22.5	37.9	140.1	7.2	17.7	20.5	36.4	98.7	189.3	345.8	324.4	21.3	12.24	2.5	255	78
1989	629	3.91	123.0	37.9	56.8	135.7	26.1	22.3	66.4	96.1	152.3	174.7	468.3	423.1	45.2	19.39	1.3	281	58
1989	818	3.76	173.8	37.9	73.2	221.9	18.4	58.5	20.6	8.9	217.1	366.1	604.4	592.1	12.3	25.10	6.4	710	125
1989	901	3.76	173.8	32.4	63.4	217.9	6.1	50.2	6.1	23.6	222.8	224.6	550.0	471.0	79.0	16.30	6.5	655	153
1989	921	3.84	144.5	21.5	39.5	186.6	3.3	29.5	4.4	4.8	214.3	151.8	429.3	370.9	58.4	16.10	7.6	449	154
1989	929	3.89	128.8	24.5	41.2	188.8	4.9	29.9	7.9	6.3	251.0	99.8	425.9	357.1	68.8	16.30	7.6	465	166
1989	1019	4.02	95.5	16.5	26.3	148.3	3.8	16.5	2.1	4.4	169.2	64.5	309.0	238.0	71.0	16.90	5.5	353	188

EGIL runoff chemistry 89-90 ueq/l 30 3 91

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	SUM+	SUM-	A-	TOC	C.D.	SIO2	ILAL	TotN
1989	1102	4.03	93.3	16.5	21.4	69.6	3.8	13.0	14.8	41.1	93.1	72.9	232.4	207.0	25.4	11.4	2.22	1.4	86	-99
1989	1116	3.98	104.7	20.5	27.2	107.4	5.1	19.6	3.1	22.5	174.9	87.4	287.5	284.8	2.7	7.5	0.36	2.6	109	-99
1989	1207	3.98	104.7	24.0	28.8	101.8	7.4	16.3	2.0	36.4	166.4	91.6	285.0	294.4	-9.5	7.5	-1.26	4.0	111	-99
1990	111	3.94	114.8	22.5	34.6	106.6	4.6	26.9	6.4	50.0	146.7	141.6	316.3	338.3	-22.0	5.7	-3.85	5.4	86	-99
1990	202	3.98	104.7	28.9	43.6	168.8	8.2	25.9	46.4	78.2	231.3	137.4	426.5	446.9	-20.3	8.2	-2.49	2.5	90	-99
1990	209	4.11	77.6	14.5	20.6	110.5	6.4	13.1	15.1	31.8	152.3	75.0	257.7	259.0	-1.3	6.4	-0.20	1.5	84	-99
1990	223	4.24	57.5	12.0	14.8	97.4	4.9	8.3	12.1	21.8	104.4	68.7	207.1	194.9	12.2	6.4	1.89	1.1	90	-99
1990	308	4.11	77.6	13.0	17.3	103.5	5.6	13.1	3.9	9.7	146.7	75.0	233.9	231.4	2.6	7.2	0.36	1.8	114	-99
1990	322	4.01	97.7	20.5	32.9	155.3	6.1	17.2	18.5	37.1	203.1	112.4	348.2	352.6	-4.4	6.3	-0.71	1.5	96	-99
1990	418	4.18	66.1	11.5	16.5	78.7	3.6	11.0	3.1	21.4	81.8	81.2	190.4	184.4	6.0	7.1	0.84	1.5	100	-99
1990	531	3.97	107.2	22.0	30.4	103.1	1.5	20.3	1.5	37.8	81.8	168.6	286.0	288.3	-2.3	9.1	-0.25	3.7	106	830
1990	614	3.99	102.3	21.5	23.9	80.0	2.3	15.4	5.0	18.6	64.9	160.3	250.4	243.7	6.6	9.9	0.67	3.2	130	615
1990	628	4.07	85.1	13.0	16.5	46.1	0.5	9.7	2.9	17.9	31.0	99.9	173.7	148.8	24.9	12.4	2.01	1.6	145	704
1990	711	4.17	67.6	7.5	8.2	39.2	0.5	6.4	3.4	2.0	33.9	41.6	132.8	77.5	55.3	19.9	2.78	2.0	207	572
1990	817	3.87	134.9	27.0	37.8	80.5	3.3	33.7	17.5	105.7	56.4	177.0	334.7	339.1	-4.4	8.7	-0.51	5.4	90	2230
1990	823	4.10	79.4	9.5	10.7	52.6	1.0	11.0	1.1	2.1	48.0	75.0	165.4	125.1	40.4	11.3	3.57	2.7	147	317

KIM runoff chemistry 89-90 ueq/l 30 3 91

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	SUM+	SUM-	A-	TOC	C.D.	SIO2	ILAL	TotN
1989	1103	4.04	91.2	10.5	18.9	90.0	9.2	11.0	4.1	5.6	107.2	54.1	235.0	166.9	68.1	8.2	8.3	1.7	172	-99
1989	1116	4.22	60.3	7.5	10.7	71.3	4.1	10.4	1.1	2.6	95.9	27.1	165.3	125.6	39.7	12.1	3.3	1.8	145	-99
1989	1207	4.26	55.0	12.5	14.0	79.6	5.6	9.6	7.2	4.4	104.4	27.1	183.5	135.8	47.6	12.9	3.7	2.8	163	-99
1990	111	4.22	60.3	10.5	14.0	77.4	6.4	13.0	2.9	5.1	98.7	37.5	184.5	141.3	43.2	13.4	3.2	4.1	171	-99
1990	209	4.07	85.1	10.5	20.6	110.5	6.1	15.4	4.0	10.3	73.4	52.1	252.2	135.7	116.5	11.2	10.4	3	151	-99
1990	223	4.24	57.5	8.5	13.2	87.4	5.1	11.1	0.9	6.2	95.9	39.6	183.7	141.7	42.0	13.2	3.2	2.3	169	-99
1990	308	4.22	60.3	6.0	9.9	83.1	6.1	10.3	9.2	4.8	98.7	31.2	184.8	134.8	50.1	12.4	4.0	1.8	184	-99
1990	322	4.17	67.6	7.0	13.2	85.3	7.4	8.8	3.1	2.9	104.4	33.3	192.4	140.6	51.8	14.7	3.5	1.8	220	-99
1990	418	4.28	52.5	6.0	9.9	76.6	5.4	9.2	0.9	2.4	101.6	22.9	160.4	126.9	33.5	12.5	2.7	1.5	146	-99
1990	531	4.12	75.9	11.5	18.1	100.9	1.5	13.2	3.0	40.0	79.0	77.0	224.1	196.0	28.1	12.5	2.3	2.6	165	977
1990	614	4.24	57.5	10.0	10.7	81.4	1.5	8.8	5.6	4.4	79.0	50.0	175.5	133.3	42.2	16.0	2.6	2.9	200	477
1990	628	4.23	58.9	8.5	11.5	78.3	1.8	9.9	4.2	2.7	76.2	20.8	173.1	99.7	73.4	20.5	3.6	2.5	263	522
1990	711	4.22	60.3	6.0	8.2	26.5	1.5	8.1	1.5	0.8	79.0	10.4	112.1	90.2	21.9	19.7	1.1	2.3	216	419
1990	817	4.08	83.2	9.0	14.8	95.7	2.6	12.0	10.1	5.6	121.3	47.9	227.4	174.8	52.5	14.0	3.8	3.9	177	789
1990	823	4.18	66.1	6.5	9.0	72.6	2.0	10.0	1.3	0.3	90.3	39.6	167.6	130.1	37.5	12.9	2.9	2.5	178	323

ROLF runoff chemistry 89-90 ueq/l 30 3 91

Year	Date	pH	H+	Ca	Mg	Na	K	Al	NH4	NO3	Cl	SO4	SUM+	SUM-	A-	TOC	C.D.	SIO2	ILAL	TotN
1989	1103	3.89	128.8	19.0	35.4	148.3	8.4	17.6	3.1	48.2	163.6	108.3	360.6	320.1	40.5	1.3	32.38	1.4	95	-99
1989	1116	3.97	107.2	15.5	28.0	139.6	9.0	17.0	4.1	11.0	228.5	56.2	320.2	295.7	24.5	9.0	2.71	1.4	94	-99
1989	1207	4.05	89.1	15.5	28.8	137.0	10.5	13.9	11.0	9.0	220.0	54.1	305.8	283.1	22.6	10.2	2.22	1.9	105	-99
1990	111	3.94	114.8	22.5	41.1	188.4	7.4	17.4	17.4	44.6	242.6	124.9	409.0	412.1	-3.2	5.8	-0.55	1.5	72	-99
1990	209	4.03	93.3	14.0	24.7	159.6	8.7	10.9	3.4	29.3	222.9	70.8	314.5	323.0	-8.4	5.4	-1.55	0.7	62	-99
1990	223	4.14	72.4	11.0	16.5	147.0	6.9	7.3	2.7	20.7	149.5	81.2	263.8	251.4	12.4	6.9	1.79	0.6	83	-99
1990	308	4.11	77.6	11.0	17.3	143.6	7.7	9.6	2.3	6.0	174.9	72.9	269.0	253.8	15.3	7.5	2.03	1.3	99	-99
1990	322	3.91	123.0	23.0	46.1	226.2	9.0	20.1	4.4	26.4	318.8	95.8	451.7	441.0	10.7	7.1	1.51	1.5	94	-99
1990	418	3.92	120.2	31.9	59.2	304.5	6.4	40.3	2.9	46.1	355.4	89.5	565.5	491.0	74.5	6.6	11.24	2.0	68	-99
1990	531	4.08	83.2	32.4	51.8	216.6	13.0	29.2	29.1	35.0	310.3	137.4	455.3	482.7	-27.4	8.8	-3.10	1.6	35	1270
1990	614	3.87	134.9	40.9	65.0	287.1	3.8	48.0	18.4	16.4	268.0	312.3	598.1	596.7	1.4	10.9	0.13	4.3	80	810
1990	711	4.15	70.8	7.5	9.9	102.2	0.5	9.2	3.8	1.8	79.0	41.6	203.8	122.4	81.4	28.4	2.87	2.1	221	48
1990	817	3.88	131.8	18.0	30.4	155.3	10.7	16.5	10.5	17.9	205.9	120.8	373.3	344.6	28.7	12.8	2.24	2.9	107	855
1990	823	4.23	58.9	5.5	7.4	73.5	3.8	5.9	13.8	2.0	56.4	58.3	168.8	116.7	52.1	12.4	4.20	1.2	122	516

APPENDIX 9

Appendix 9. Risdalsheia. Input-output budgets

Flux and concentrations units meq/m2/yr and ueq/l 03/31 91
EGIL year 87-88 26-11-87 to 11-25-88 concentrations

	Input						Output		concentrations In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	1366						1235	H2O			
H+	70.2	0.0	1.0	19.0	20.0	90.2	86.5	H+	51.4	66.0	70.0
Na	55.6	15.8	0.0	0.0	15.8	71.4	81.2	Na	40.7	52.2	65.7
K	3.7	0.3	0.0	0.0	0.3	4.0	6.6	K	2.7	3.0	5.3
Ca	10.6	0.7	0.0	0.0	0.7	11.3	18.8	Ca	7.8	8.3	15.2
Mg	13.9	3.6	0.0	0.0	3.6	17.5	23.3	Mg	10.2	12.8	18.9
Al	0	0.0	0.0	0.0	0.0	0.0	13.5	Al	0.0	0.0	10.9
NH4	43.7	0.0	4.0	0.0	4.0	47.7	28.1	NH4	32.0	34.9	22.8
NO3	47.9	0.0	0.0	11.0	11.0	58.9	37.6	NO3	35.1	43.1	30.4
Cl	64.7	18.4	0.0	0.0	18.4	83.1	83.1	Cl	47.4	60.8	67.3
SO4	65.2	1.9	5.0	8.0	14.9	80.1	102.4	SO4	47.7	58.6	82.9
A-	19.9	0.1	0.0	0.0	0.1	20.0	34.9	A-	14.6	14.6	28.3
sum+	197.7	20.37	5	19	44.37	242.1	258	sum+	144.7	177.2	208.9
sum-	197.7	20.37	5	19	44.37	242.1	258	sum-	144.7	177.2	208.9
SBC	127.5	20.37	4	0	24.37	151.9	158	SBC	93.3	111.2	127.9
SSA	177.8	20.3	5	19	44.3	222.1	223.1	SSA	130.2	162.6	180.6
alk	-50.3	0.074	-1	-19	-19.9	-70.2	-65.1	alk	-36.8	-51.4	-52.7
TOC							12.9	TOC			10.4
SiO2							2.12	SiO2			1.7
c.d.							2.71	c.d.			2.71

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
EGIL winter 87-88 26-11-87 to 11-05-88 concentrations

	Input						Output		concentrations		
	Wet	Dry				Total			Wet	In Total	Out
		mar.	part.	gases	subtot.						
H2O	336					336	331	H2O			
H+	13.8	0.0	0.0	0.0	0.0	13.8	20.7	H+	41.1	41.1	62.5
Na	22.5	1.4	0.0	0.0	1.4	23.9	28.6	Na	67.0	71.1	86.4
K	1.5	0.0	0.0	0.0	0.0	1.5	2.9	K	4.5	4.5	8.8
Ca	2.2	0.2	0.0	0.0	0.2	2.4	5.2	Ca	6.5	7.1	15.7
Mg	4.5	0.4	0.0	0.0	0.4	4.9	7	Mg	13.4	14.6	21.1
Al	0	0.0	0.0	0.0	0.0	0.0	4.3	Al	0.0	0.0	13.0
NH4	10.4	0.0	0.0	0.0	0.0	10.4	10.5	NH4	31.0	31.0	31.7
NO3	9.1	0.0	0.0	0.0	0.0	9.1	13.7	NO3	27.1	27.1	41.4
Cl	27.9	1.7	0.0	0.0	1.7	29.6	29.6	Cl	83.0	88.1	89.4
SO4	8.7	0.2	0.0	0.0	0.2	8.9	32.2	SO4	25.9	26.5	97.3
A-	9.2	0.1	0.0	0.0	0.1	9.3	3.7	A-	27.4	27.7	11.2
sum+	54.9	2.0	0.0	0.0	2.0	56.9	79.2	sum+	163.4	169.3	239.3
sum-	54.9	2.0	0.0	0.0	2.0	56.9	79.2	sum-	163.4	169.3	239.3
SBC	41.1	2	0	0	2	43.1	54.2	SBC	122.3	128.3	163.7
SSA	45.7	1.9	0	0	1.9	47.6	75.5	SSA	136.0	141.7	228.1
alk	-4.6	0.1	0	0	0.1	-4.5	-21.3	alk	-14	-13	-64
TOC							2.3	TOC	0.0	0.0	6.9
SiO2							0.6	SiO2	0.0	0.0	1.8
c.d.							1.61	c.d.	0.00	0.00	1.61

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
EGIL summer 87-88 12-05-88 to 11-25-88 concentrations

	Input						Output		concentrations		
	Wet	Dry				Total			Wet	In Total	Out
		mar.	part.	gases	subtot.						
H2O	1030					1030	904	H2O			
H+	56.4	0.0	1.0	19.0	20.0	76.4	65.8	H+	54.8	74.2	72.8
Na	33.1	14.4	0.0	0.0	14.4	47.5	52.6	Na	32.1	46.1	58.2
K	2.2	0.3	0.0	0.0	0.3	2.5	3.7	K	2.1	2.4	4.1
Ca	8.4	0.5	0.0	0.0	0.5	8.9	13.6	Ca	8.2	8.6	15.0
Mg	9.4	3.2	0.0	0.0	3.2	12.6	16.3	Mg	9.1	12.2	18.0
Al	0	0.0	0.0	0.0	0.0	0.0	9.2	Al	0.0	0.0	10.2
NH4	33.3	0.0	4.0	0.0	4.0	37.3	17.6	NH4	32.3	36.2	19.5
NO3	38.8	0.0	0.0	11.0	11.0	49.8	23.9	NO3	37.7	48.3	26.4
Cl	36.8	16.7	0.0	0.0	16.7	53.5	53.5	Cl	35.7	51.9	59.2
SO4	56.5	1.7	5.0	8.0	14.7	71.2	70.2	SO4	54.9	69.1	77.7
A-	10.7	0.0	0.0	0.0	0.0	10.7	31.2	A-	10.4	10.4	34.5
sum+	142.8	18.4	5.0	19.0	42.4	185.2	178.8	sum+	138.6	179.8	197.8
sum-	142.8	18.4	5.0	19.0	42.4	185.2	178.8	sum-	138.6	179.8	197.8
SBC	86.4	18.4	4.0	0.0	22.4	108.8	103.8	SBC	83.9	105.6	114.8
SSA	132.1	18.4	5.0	19.0	42.4	174.5	147.6	SSA	128.3	169.4	163.3
alk	-45.7	0.0	-1.0	-19.0	-20.0	-65.7	-43.8	alk	-44.4	-63.8	-48.5
TOC							10.6	TOC	0.0	0.0	11.7
SiO2							1.52	SiO2	0.0	0.0	1.7
c.d.							2.94	c.d.	0.00	0.00	2.94

Flux and concentrations units meq/m2/yr and ueq/l   03/31   91
KIM year 87-88 26-11-87 to 11-25-88   concentrations

	Input						Output		concentrations In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	997						903	H2O			
H+	7.0	0.0	1.0	19.0	20.0	27.0	55.4	H+	7.0	27.1	61.4
Na	45.6	15.8	0.0	0.0	15.8	61.4	53.7	Na	45.7	61.5	59.5
K	1.1	0.3	0.0	0.0	0.3	1.4	4.0	K	1.1	1.4	4.4
Ca	3.9	0.7	0.0	0.0	0.7	4.6	7.6	Ca	3.9	4.6	8.4
Mg	10.5	3.6	0.0	0.0	3.6	14.1	11.7	Mg	10.5	14.1	13.0
Al	0.0	0.0	0.0	0.0	0.0	0.0	8.0	Al	0.0	0.0	8.9
NH4	1.2	0.0	4.0	0.0	4.0	5.2	6.7	NH4	1.2	5.2	7.4
NO3	3.4	0.0	0.0	11.0	11.0	14.4	4.1	NO3	3.4	14.4	4.5
Cl	49.7	18.4	0.0	0.0	18.4	68.1	62.2	Cl	49.8	68.3	68.9
SO4	7.6	1.9	5.0	8.0	14.9	22.5	30.1	SO4	7.6	22.6	33.3
A-	8.6	0.1	0.0	0.0	0.1	8.7	50.7	A-	8.6	8.7	56.1
sum+	69.3	20.4	5.0	19.0	44.4	113.7	147.1	sum+	69.5	114.0	162.9
sum-	69.3	20.4	5.0	19.0	44.4	113.7	147.1	sum-	69.5	114.0	162.9
SBC	62.3	20.4	4.0	0.0	24.4	86.7	83.7	SBC	62.5	86.9	92.7
SSA	60.7	20.3	5.0	19.0	44.3	105.0	96.4	SSA	60.9	105.3	106.8
alk	1.6	0.1	-1.0	-19.0	-19.9	-18.3	-12.7	alk	1.6	-18.4	-14.1
TOC							14	TOC			15.5
SiO2							1.93	SiO2			2.1
c.d.							3.62	c.d.			3.62

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
KIM winter 87-88 26-11-87 to 11-05-88

	Input						Output		concentrations		
	Wet	Dry				Total			Wet	In Total	Out
		mar.	part.	gases	subtot.						
H2O	195					195	208	H2O			
H+	1.4	0.0	0.0	0.0	0.0	1.4	10.4	H+	7.2	7.2	50.0
Na	8.4	1.4	0.0	0.0	1.4	9.8	15.0	Na	43.1	50.3	72.1
K	0.4	0.0	0.0	0.0	0.0	0.4	1.3	K	2.1	2.1	6.3
Ca	0.7	0.2	0.0	0.0	0.2	0.9	1.6	Ca	3.6	4.6	7.7
Mg	1.9	0.4	0.0	0.0	0.4	2.3	2.7	Mg	9.7	11.8	13.0
Al	0.0	0.0	0.0	0.0	0.0	0.0	1.7	Al	0.0	0.0	8.2
NH4	0.3	0.0	0.0	0.0	0.0	0.3	2.3	NH4	1.5	1.5	11.1
NO3	0.1	0.0	0.0	0.0	0.0	0.1	2.2	NO3	0.5	0.5	10.6
Cl	11.5	1.7	0.0	0.0	1.7	13.2	15.8	Cl	59.0	67.7	76.0
SO4	1.6	0.2	0.0	0.0	0.2	1.8	9.5	SO4	8.2	9.2	45.7
A-	-0.1	0.1	0.0	0.0	0.1	0.0	7.5	A-	-0.5	0.0	36.1
sum+	13.1	2.0	0.0	0.0	2.0	15.1	35.0	sum+	67.2	77.4	168.3
sum-	13.1	2.0	0.0	0.0	2.0	15.1	35.0	sum-	67.2	77.4	168.3
SBC	11.7	2.0	0.0	0.0	2.0	13.7	22.9	SBC	60.0	70.3	110.1
SSA	13.2	1.9	0.0	0.0	1.9	15.1	27.5	SSA	67.7	77.4	132.2
alk	-1.5	0.1	0.0	0.0	0.1	-1.4	-4.6	alk	-7.7	-7.2	-22.1
TOC							2.4	TOC	0.0	0.0	11.5
SiO2							0.59	SiO2	0.0	0.0	2.8
c.d.							3.13	c.d.	0.00	ERR	3.13

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
KIM summer 87-88 12-05-88 to 11-25-88

	Input						Output		concentrations		
	Wet	Dry				Total			Wet	In Total	Out
		mar.	part.	gases	subtot.						
H2O	802					802	695	H2O			
H+	5.6	0.0	1.0	19.0	20.0	25.6	45.0	H+	7.0	31.9	64.7
Na	37.2	14.4	0.0	0.0	14.4	51.6	38.7	Na	46.4	64.3	55.7
K	0.7	0.3	0.0	0.0	0.3	1.0	2.7	K	0.9	1.2	3.9
Ca	3.2	0.5	0.0	0.0	0.5	3.7	6.0	Ca	4.0	4.6	8.6
Mg	8.6	3.2	0.0	0.0	3.2	11.8	9.0	Mg	10.7	14.7	12.9
Al	0.0	0.0	0.0	0.0	0.0	0.0	6.3	Al	0.0	0.0	9.1
NH4	0.9	0.0	4.0	0.0	4.0	4.9	4.4	NH4	1.1	6.1	6.3
NO3	3.3	0.0	0.0	11.0	11.0	14.3	1.9	NO3	4.1	17.8	2.7
Cl	38.2	16.7	0.0	0.0	16.7	54.9	46.4	Cl	47.6	68.5	66.8
SO4	6.0	1.7	5.0	8.0	14.7	20.7	20.6	SO4	7.5	25.8	29.6
A-	8.7	0.0	0.0	0.0	0.0	8.7	43.2	A-	10.8	10.8	62.2
sum+	56.2	18.4	5.0	19.0	42.4	98.6	112.1	sum+	70.1	122.9	161.3
sum-	56.2	18.4	5.0	19.0	42.4	98.6	112.1	sum-	70.1	122.9	161.3
SBC	50.6	18.4	4.0	0.0	22.4	73.0	60.8	SBC	63.1	91.0	87.5
SSA	47.5	18.4	5.0	19.0	42.4	89.9	68.9	SSA	59.2	112.1	99.1
alk	3.1	0.0	-1.0	-19.0	-20.0	-16.9	-8.1	alk	3.9	-21.1	-11.7
TOC							11.6	TOC	0.0	0.0	16.7
SiO2							1.34	SiO2	0.0	0.0	1.9
c.d.							3.72	c.d.	0.00	0.00	3.72

Flux and concentrations units meq/m2/yr and ueq/l 03/31 91

ROLF year 87-88 26-11-87 to 11-25-88

	Input Wet	Dry mar.	Dry part.	Dry gases	Dry subtot.	Total	Output		concentrations Wet	In Total	Out
H2O	1935						1735	H2O			
H+	119.2	0.0	1.0	19.0	20.0	139.2	135.9	H+	61.6	72.0	78.4
Na	73.3	57.3	0.0	0.0	57.3	130.6	158.0	Na	37.9	67.5	91.1
K	4.5	1.2	0.0	0.0	1.2	5.7	7.0	K	2.3	2.9	4.0
Ca	14.7	2.5	0.0	0.0	2.5	17.2	22.0	Ca	7.6	8.9	12.7
Mg	18.9	13.1	0.0	0.0	13.1	32.0	34.6	Mg	9.8	16.5	19.9
Al	0	0.0	0.0	0.0	0.0	0.0	14.2	Al	0.0	0.0	8.2
NH4	74.2	0.0	4.0	0.0	4.0	78.2	19.9	NH4	38.4	40.4	11.5
NO3	79.2	0.0	0.0	11.0	11.0	90.2	34.5	NO3	40.9	46.6	19.9
Cl	81.1	66.9	0.0	0.0	66.9	148.0	148.0	Cl	41.9	76.5	85.3
SO4	118.5	6.9	5.0	8.0	19.9	138.4	146.0	SO4	61.3	71.5	84.2
A-	26	0.3	0.0	0.0	0.3	26.3	63.1	A-	13.4	13.6	36.4
sum+	304.8	74.1	5.0	19.0	98.1	402.9	391.6	sum+	157.6	208.2	225.8
sum-	304.8	74.1	5.0	19.0	98.1	402.9	391.6	sum-	157.6	208.2	225.8
SBC	185.6	74.1	4.0	0.0	78.1	263.7	241.5	SBC	95.9	136.3	139.2
SSA	278.8	73.8	5.0	19.0	97.8	376.6	328.5	SSA	144.1	194.7	189.4
alk	-93.2	0.3	-1.0	-19.0	-19.7	-112.9	-87.0	alk	-48.2	-58.4	-50.2
TOC							20.3	TOC			11.7
SiO2							2.5	SiO2			1.4
c.d.							3.1	c.d.			3.11

ROLF winter 87-88 26-11-87 to 11-05-88 concentrations

	Input						Output		concentrations In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	912.5						912.5	H2O			
H+	62.5						54.3	H+	68.5	ERR	59.5
Na	40.3						91.2	Na	44.2	ERR	99.9
K	2.3						4.2	K	2.5	ERR	4.6
Ca	6.9						8.1	Ca	7.6	ERR	8.9
Mg	9.7						12.8	Mg	10.6	ERR	14.0
Al	0						5	Al	0.0	ERR	5.5
NH4	41.5						11.7	NH4	45.5	ERR	12.8
NO3	41.1						22.1	NO3	45.0	ERR	24.2
Cl	44.6						82.2	Cl	48.9	ERR	90.1
SO4	61.9						60.5	SO4	67.8	ERR	66.3
A-	15.6	0	0	0	0	0	22.5	A-	17.1	ERR	24.7
sum+	163.2	0	0	0	0	0	187.3	sum+	178.8	ERR	205.3
sum-	163.2	0	0	0	0	0	187.3	sum-	178.8	ERR	205.3
SBC	100.7	0	0	0	0	0	128	SBC	110.4	ERR	140.3
SSA	147.6	0	0	0	0	0	164.8	SSA	161.8	ERR	180.6
alk	-46.9	0	0	0	0	0	-36.8	alk	-51.4	ERR	-40.3
TOC							7.41	TOC	0.0	ERR	8.1
SiO2							0.74	SiO2	0.0	ERR	0.8
c.d.							3.04	c.d.	0.00	ERR	3.04

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91

ROLF summer 87-88 12-05-88 to 11-25-88 concentrations

	Input						Output		concentrations In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	1022						822	H2O			
H+	56.7						81.6	H+	55.5	ERR	99.3
Na	33						66.8	Na	32.3	ERR	81.3
K	2.2						2.8	K	2.2	ERR	3.4
Ca	7.8						13.9	Ca	7.6	ERR	16.9
Mg	9.2						21.8	Mg	9.0	ERR	26.5
Al	0						9.2	Al	0.0	ERR	11.2
NH4	32.7						8.2	NH4	32.0	ERR	10.0
NO3	38.1						12.4	NO3	37.3	ERR	15.1
Cl	36.5						65.8	Cl	35.7	ERR	80.0
SO4	56.6						85.5	SO4	55.4	ERR	104.0
A-	10.4	0	0	0	0	0	40.6	A-	10.2	ERR	49.4
sum+	141.6	0	0	0	0	0	204.3	sum+	138.6	ERR	248.5
sum-	141.6	0	0	0	0	0	204.3	sum-	138.6	ERR	248.5
SBC	84.9	0	0	0	0	0	113.5	SBC	83.1	ERR	138.1
SSA	131.2	0	0	0	0	0	163.7	SSA	128.4	ERR	199.1
alk	-46.3	0	0	0	0	0	-50.2	alk	-45.3	ERR	-61.1
TOC							12.9	TOC	0.0	ERR	15.7
SiO2							1.73	SiO2	0.0	ERR	2.1
c.d.							3.15	c.d.	0.00	ERR	3.15

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
EGIL year 88-89 25-11-88 to 24-11-89 concentrations

	Input						Output		concentrations		
	Wet	Dry				Total			Wet	In Total	Out
		mar.	part.	gases	subtot.						
H2O	970						1005	H2O			
H+	58.4	0.0	1.0	19.0	20.0	78.4	76.5	H+	60.2	80.8	76.1
Na	53.0	23.5	0.0	0.0	23.5	76.5	81.3	Na	54.6	78.8	80.9
K	3.5	0.5	0.0	0.0	0.5	4.0	6.8	K	3.6	4.1	6.8
Ca	9.1	1.0	0.0	0.0	1.0	10.1	18	Ca	9.4	10.4	17.9
Mg	13.8	5.4	0.0	0.0	5.4	19.2	23.3	Mg	14.2	19.8	23.2
Al	0.0	0.0	0.0	0.0	0.0	0.0	15.1	Al	0.0	0.0	15.0
NH4	20.1	0.0	4.0	0.0	4.0	24.1	26.2	NH4	20.7	24.8	26.1
NO3	32.4	0.0	0.0	11.0	11.0	43.4	33.1	NO3	33.4	44.7	32.9
Cl	62.3	27.4	0.0	0.0	27.4	89.7	89.7	Cl	64.2	92.5	89.3
SO4	67.1	2.8	5.0	8.0	15.8	82.9	98.8	SO4	69.2	85.5	98.3
A-	-3.9	0.1	0.0	0.0	0.1	-3.8	25.6	A-	-4.0	-3.9	25.5
sum+	157.9	30.33	5	19	54.33	212.2	247.2	sum+	162.8	218.8	246.0
sum-	157.9	30.33	5	19	54.33	212.2	247.2	sum-	162.8	218.8	246.0
SBC	99.5	30.33	4	0	34.33	133.8	155.6	SBC	102.6	138.0	154.8
SSA	161.8	30.22	5	19	54.22	216	221.6	SSA	166.8	222.7	220.5
alk	-62.3	0.11	-1	-19	-19.9	-82.2	-66	alk	-64.2	-84.7	-65.7
TOC							10.8	TOC			10.7
SiO2							2.42	SiO2			2.4
c.d.							2.37	c.d.			2.37

Flux and concentrations units meq/m2/yr and ueq/l 04/02 91
EGIL winter 88-89 25-11-88 to 11-05-89 concentrations

	Input						Output		In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	517						615	H2O			
H+	39.1						40.6	H+	75.6	ERR	66.0
Na	37.2						55.3	Na	72.0	ERR	89.9
K	1.1						5.7	K	2.1	ERR	9.3
Ca	5.2						11.3	Ca	10.1	ERR	18.4
Mg	9.6						14.7	Mg	18.6	ERR	23.9
Al	0						9.2	Al	0.0	ERR	15.0
NH4	7.1						22.1	NH4	13.7	ERR	35.9
NO3	14.9						24.2	NO3	28.8	ERR	39.3
Cl	42.7						59.5	Cl	82.6	ERR	96.7
SO4	40.9						63	SO4	79.1	ERR	102.4
A-	0.8	0	0	0	0	0	12.2	A-	2	ERR	19.8
sum+	99.3	0	0	0	0	0	158.9	sum+	192.1	ERR	258.4
sum-	99.3	0	0	0	0	0	158.9	sum-	192.1	ERR	258.4
SBC	60.2	0	0	0	0	0	109.1	SBC	116.4	ERR	177.4
SSA	98.5	0	0	0	0	0	146.7	SSA	190.5	ERR	238.5
alk	-38.3	0	0	0	0	0	-37.6	alk	-74	ERR	-61
TOC							6.2	TOC	0.0	ERR	10.1
SiO2							1.15	SiO2	0.0	ERR	1.9
c.d.							1.97	c.d.	0.00	ERR	1.97

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
EGIL summer 88-89 11-05-89 to 11-24-89 concentrations

	Input						Output		In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	453.3						390	H2O			
H+	19.3						35.9	H+	42.6	ERR	92.1
Na	15.8						26	Na	34.9	ERR	66.7
K	2.3						1.1	K	5.1	ERR	2.8
Ca	3.9						6.7	Ca	8.6	ERR	17.2
Mg	4.1						8.6	Mg	9.0	ERR	22.1
Al	0						5.9	Al	0.0	ERR	15.1
NH4	13.1						4.1	NH4	28.9	ERR	10.5
NO3	17.4						8.9	NO3	38.4	ERR	22.8
Cl	19.6						30.2	Cl	43.2	ERR	77.4
SO4	26.2						35.8	SO4	57.8	ERR	91.8
A-	-4.7	0	0	0	0	0	13.4	A-	-10.4	ERR	34.4
sum+	58.5	0	0	0	0	0	88.3	sum+	129.1	ERR	226.4
sum-	58.5	0	0	0	0	0	88.3	sum-	129.1	ERR	226.4
SBC	39.2	0	0	0	0	0	46.5	SBC	86.5	ERR	119.2
SSA	63.2	0	0	0	0	0	74.9	SSA	139.4	ERR	192.1
alk	-24	0	0	0	0	0	-28.4	alk	-52.9	ERR	-72.8
TOC							4.6	TOC	0.0	ERR	11.8
SiO2							1.27	SiO2	0.0	ERR	3.3
c.d.							2.91	c.d.	0.00	ERR	2.91

Flux and concentrations units meq/m2/yr and ueq/l   03/31 91
KIM year 88-89 25-11-88 to 24-11-89   concentrations

	Input						Output		concentrations		
	Wet	Dry				Total			In		Out
		mar.	part.	gases	subtot.				Wet	Total	
H2O	1033						939	H2O			
H+	5.3	0.0	1.0	19.0	20.0	25.3	63.6	H+	5.1	24.5	67.7
Na	46.7	22.9	0.0	0.0	22.9	69.6	70.4	Na	45.2	67.4	75.0
K	1.1	0.5	0.0	0.0	0.5	1.6	6.7	K	1.1	1.5	7.1
Ca	3.1	1.0	0.0	0.0	1.0	4.1	8.1	Ca	3.0	4.0	8.6
Mg	11.6	5.3	0.0	0.0	5.3	16.9	12.8	Mg	11.2	16.3	13.6
Al	0.0	0.0	0.0	0.0	0.0	0.0	9.6	Al	0.0	0.0	10.2
NH4	1.6	0.0	4.0	0.0	4.0	5.6	5.5	NH4	1.5	5.4	5.9
NO3	2.0	0.0	0.0	11.0	11.0	13.0	5.1	NO3	1.9	12.6	5.4
Cl	58.7	26.8	0.0	0.0	26.8	85.5	85.5	Cl	56.8	82.8	91.1
SO4	8.4	2.8	5.0	8.0	15.8	24.2	37.3	SO4	8.1	23.4	39.7
A-	0.3	0.1	0.0	0.0	0.1	0.4	48.8	A-	0.3	0.4	52.0
sum+	69.4	29.7	5.0	19.0	53.7	123.1	176.7	sum+	67.2	119.1	188.2
sum-	69.4	29.7	5.0	19.0	53.7	123.1	176.7	sum-	67.2	119.1	188.2
SBC	64.1	29.7	4.0	0.0	33.7	97.8	103.5	SBC	62.1	94.6	110.2
SSA	69.1	29.6	5.0	19.0	53.6	122.7	127.9	SSA	66.9	118.7	136.2
alk	-5.0	0.1	-1.0	-19.0	-19.9	-24.9	-24.4	alk	-4.8	-24.1	-26.0
TOC							12.8	TOC			13.6
SiO2							2.17	SiO2			2.3
c.d.							3.81	c.d.			3.81

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
KIM winter 88-89 25-11-88 to 11-05-89 concentrations

	Input Wet	Dry mar.	Dry part.	Dry gases	Dry subtot.	Total	Output		Concentrations In Wet	Concentrations In Total	Concentrations Out
H2O	500.1						529	H2O			
H+	2.5						31.5	H+	5.0	ERR	59.5
Na	20.5						35.4	Na	41.0	ERR	66.9
K	0.3						4.2	K	0.6	ERR	7.9
Ca	1.6						3.8	Ca	3.2	ERR	7.2
Mg	5.4						6.1	Mg	10.8	ERR	11.5
Al	0						4.4	Al	0.0	ERR	8.3
NH4	0.6						4.3	NH4	1.2	ERR	8.1
NO3	0.8						3.2	NO3	1.6	ERR	6.0
Cl	26						42.8	Cl	52.0	ERR	80.9
SO4	4.1						18.6	SO4	8.2	ERR	35.2
A-	0	0	0	0	0	0	25.1	A-	0.0	ERR	47.4
sum+	30.9	0	0	0	0	0	89.7	sum+	61.8	ERR	169.6
sum-	30.9	0	0	0	0	0	89.7	sum-	61.8	ERR	169.6
SBC	28.4	0	0	0	0	0	53.8	SBC	56.8	ERR	101.7
SSA	30.9	0	0	0	0	0	64.6	SSA	61.8	ERR	122.1
alk	-2.5	0	0	0	0	0	-10.8	alk	-5.0	ERR	-20.4
TOC							7.7	TOC	0.0	ERR	14.6
SiO2							1.06	SiO2	0.0	ERR	2.0
c.d.							3.26	c.d.	ERR	ERR	3.26

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
KIM summer 88-89 11-05-89 to 11-24-89 concentrations

	Input Wet	Dry mar.	Dry part.	Dry gases	Dry subtot.	Total	Output		Concentrations In Wet	Concentrations In Total	Concentrations Out
H2O	532.8						410	H2O			
H+	2.8						32.1	H+	5.3	ERR	78.3
Na	26.2						35	Na	49.2	ERR	85.4
K	0.8						2.5	K	1.5	ERR	6.1
Ca	1.5						4.3	Ca	2.8	ERR	10.5
Mg	6.2						6.7	Mg	11.6	ERR	16.3
Al	0						5.2	Al	0.0	ERR	12.7
NH4	1						1.2	NH4	1.9	ERR	2.9
NO3	1.2						1.9	NO3	2.3	ERR	4.6
Cl	32.6						42.7	Cl	61.2	ERR	104.1
SO4	4.3						18.7	SO4	8.1	ERR	45.6
A-	0.4	0	0	0	0	0	23.7	A-	0.8	ERR	57.8
sum+	38.5	0	0	0	0	0	87	sum+	72.3	ERR	212.2
sum-	38.5	0	0	0	0	0	87	sum-	72.3	ERR	212.2
SBC	35.7	0	0	0	0	0	49.7	SBC	67.0	ERR	121.2
SSA	38.1	0	0	0	0	0	63.3	SSA	71.5	ERR	154.4
alk	-2.4	0	0	0	0	0	-13.6	alk	-4.5	ERR	-33.2
TOC							5.1	TOC	0.0	ERR	12.4
SiO2							1.11	SiO2	0.0	ERR	2.7
c.d.							4.65	c.d.	0.00	ERR	4.65

Flux and concentrations units meq/m2/yr and ueq/l 03/31 91
ROLF year 88-89 25-11-88 to 24-11-89 concentrations

	Input						Output		In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	1080						934	H2O			
H+	61.1	0.0	1.0	19.0	20.0	81.1	98.5	H+	56.6	75.1	105.5
Na	56.6	89.4	0.0	0.0	89.4	146.0	137.8	Na	52.4	135.1	147.5
K	3.3	1.9	0.0	0.0	1.9	5.2	5.7	K	3.1	4.8	6.1
Ca	9.7	3.9	0.0	0.0	3.9	13.6	18.7	Ca	9.0	12.6	20.0
Mg	14.5	20.5	0.0	0.0	20.5	35.0	33.8	Mg	13.4	32.4	36.2
Al	0	0.0	0.0	0.0	0.0	0.0	20.5	Al	0.0	0.0	21.9
NH4	43.5	0.0	4.0	0.0	4.0	47.5	5.5	NH4	40.3	44.0	5.9
NO3	55.5	0.0	0.0	11.0	11.0	66.5	28.6	NO3	51.4	61.6	30.6
Cl	66.8	104.4	0.0	0.0	104.4	171.2	171.2	Cl	61.8	158.5	183.3
SO4	70.4	10.8	5.0	8.0	23.8	94.2	100.2	SO4	65.2	87.2	107.3
A-	-4	0.4	0.0	0.0	0.4	-3.6	20.5	A-	-3.7	-3.3	21.9
sum+	188.7	115.6	5.0	19.0	139.6	328.3	320.5	sum+	174.7	303.9	343.1
sum-	188.7	115.6	5.0	19.0	139.6	328.3	320.5	sum-	174.7	303.9	343.1
SBC	127.6	115.6	4.0	0.0	119.6	247.2	201.5	SBC	118.1	228.8	215.7
SSA	192.7	115.2	5.0	19.0	139.2	331.9	300.0	SSA	178.4	307.2	321.2
alk	-65.1	0.4	-1.0	-19.0	-19.6	-84.7	-98.5	alk	-60.3	-78.4	-105
TOC							6.9	TOC			7.4
SiO2							1.9	SiO2			2.0
c.d.							3.0	c.d.			2.97

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
ROLF winter 88-89 25-11-88 to 11-05-89 concentrations

	Input: Wet	Dry: mar.	part.	gases	subtot.	Total	Output		Wet	In Total	Out
H2O	517.1						529	H2O			
H+	35.3						48.5	H+	68.3	ERR	91.7
Na	36.4						74.6	Na	70.4	ERR	141.0
K	1.2						2.3	K	2.3	ERR	4.3
Ca	5.4						10.6	Ca	10.4	ERR	20.0
Mg	9						19	Mg	17.4	ERR	35.9
Al	0						11.5	Al	0.0	ERR	21.7
NH4	24.8						3.3	NH4	48.0	ERR	6.2
NO3	29.7						17.8	NO3	57.4	ERR	33.6
Cl	41.3						94.6	Cl	79.9	ERR	178.8
SO4	38.7						53.1	SO4	74.8	ERR	100.4
A-	2.4	0	0	0	0	0	4.3	A-	4.6	ERR	8.1
sum+	112.1	0	0	0	0	0	169.8	sum+	216.8	ERR	321.0
sum-	112.1	0	0	0	0	0	169.8	sum-	216.8	ERR	321.0
SBC	76.8	0	0	0	0	0	109.8	SBC	148.5	ERR	207.6
SSA	109.7	0	0	0	0	0	165.5	SSA	212.1	ERR	312.9
alk	-32.9	0	0	0	0	0	-55.7	alk	-63.6	ERR	-105
TOC							3.32	TOC	0.0	ERR	6.3
SiO2							0.69	SiO2	0.0	ERR	1.3
c.d.							1.30	c.d.	0.00	ERR	1.30

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
ROLF summer 88-89 11-05-89 to 11-24-89 concentrations

	Input: Wet	Dry: mar.	part.	gases	subtot.	Total	Output		Wet	In Total	Out
H2O	563.1						405	H2O			
H+	25.8						50	H+	45.8	ERR	123.5
Na	20.3						63.2	Na	36.1	ERR	156.0
K	2.1						3.4	K	3.7	ERR	8.4
Ca	4.3						8.1	Ca	7.6	ERR	20.0
Mg	5.6						14.8	Mg	9.9	ERR	36.5
Al	0						9	Al	0.0	ERR	22.2
NH4	18.7						2.2	NH4	33.2	ERR	5.4
NO3	25.8						10.8	NO3	45.8	ERR	26.7
Cl	25.5						76.6	Cl	45.3	ERR	189.1
SO4	31.6						47.1	SO4	56.1	ERR	116.3
A-	-6.1	0	0	0	0	0	16.2	A-	-10.8	ERR	40.0
sum+	76.8	0	0	0	0	0	150.7	sum+	136.4	ERR	372.1
sum-	76.8	0	0	0	0	0	150.7	sum-	136.4	ERR	372.1
SBC	51	0	0	0	0	0	91.7	SBC	90.6	ERR	226.4
SSA	82.9	0	0	0	0	0	134.5	SSA	147.2	ERR	332.1
alk	-31.9	0	0	0	0	0	-42.8	alk	-56.7	ERR	-106
TOC							3.6	TOC	0.0	ERR	8.9
SiO2							1.18	SiO2	0.0	ERR	2.9
c.d.							4.50	c.d.	0.00	ERR	4.50

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
EGIL winter 89-90 25-11-89 to 31-05-90 concentrations

	Input Wet	Dry mar.	part.	gases	subtot.	Total	Output		concentrations Wet	In Total	Out
H2O	590.8						615	H2O			
H+	31.9						47.7	H+	54.0	ERR	77.6
Na	70.9						59.2	Na	120.0	ERR	96.3
K	1.7						2.5	K	2.9	ERR	4.1
Ca	4.8						9.1	Ca	8.1	ERR	14.8
Mg	15.9						12.7	Mg	26.9	ERR	20.7
Al	0						8.2	Al	0.0	ERR	13.3
NH4	11.9						4	NH4	20.1	ERR	6.5
NO3	18						16.1	NO3	30.5	ERR	26.2
Cl	82.8						65.1	Cl	140.1	ERR	105.9
SO4	47.3						60.2	SO4	80.1	ERR	97.9
A-	-11	0	0	0	0	0	2	A-	-19	ERR	3.3
sum+	137.1	0	0	0	0	0	143.4	sum+	232.1	ERR	233.2
sum-	137.1	0	0	0	0	0	143.4	sum-	232.1	ERR	233.2
SBC	105.2	0	0	0	0	0	87.5	SBC	178.1	ERR	142.3
SSA	148.1	0	0	0	0	0	141.4	SSA	250.7	ERR	229.9
alk	-42.9	0	0	0	0	0	-53.9	alk	-73	ERR	-88
TOC							4.5	TOC	0.0	ERR	7.3
SiO2								SiO2	0.0	ERR	0.0
c.d.							0.44	c.d.	0.00	ERR	0.44

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
KIM winter 89-90 25-11-89 to 31-05-90 concentrations

	Input Wet	Dry mar.	part.	gases	subtot.	Total	Output		concentrations Wet	In Total	Out
H2O	606.1						602.5	H2O			
H+	3.1						38.5	H+	5.1	ERR	63.9
Na	44.3						53.5	Na	73.1	ERR	88.8
K	0.8						2.7	K	1.3	ERR	4.5
Ca	2.2						5	Ca	3.6	ERR	8.3
Mg	10.5						8.3	Mg	17.3	ERR	13.8
Al	0.0						6.8	Al	0.0	ERR	11.3
NH4	1.4						1.6	NH4	2.3	ERR	2.7
NO3	0.8						9	NO3	1.3	ERR	14.9
Cl	54.8						55.3	Cl	90.4	ERR	91.8
SO4	6.8						26.8	SO4	11.2	ERR	44.5
A-	-0.1	0	0	0	0	0	25.3	A-	-0.2	ERR	42.0
sum+	62.3	0	0	0	0	0	116.4	sum+	102.8	ERR	193.2
sum-	62.3	0	0	0	0	0	116.4	sum-	102.8	ERR	193.2
SBC	59.2	0	0	0	0	0	71.1	SBC	97.7	ERR	118.0
SSA	62.4	0	0	0	0	0	91.1	SSA	103.0	ERR	151.2
alk	-3.2	0	0	0	0	0	-20	alk	-5.3	ERR	-33.2
TOC							7.7	TOC	0.0	ERR	12.8
SiO2							1.06	SiO2	0.0	ERR	1.8
c.d.							3.29	c.d.	0.00	ERR	3.29

Flux and concentrations units meq/m2/yr and ueq/l 03/30 91
ROLF winter 89-90 25-11-89 to 31-05-90 concentrations

	Input						Output		In		Out
	Wet	Dry				Total			Wet	Total	
		mar.	part.	gases	subtot.						
H2O	728.0						616.5	H2O			
H+	34.1						56.3	H+	46.8	ERR	91.3
Na	72.4						104.2	Na	99.5	ERR	169.0
K	1.9						5	K	2.6	ERR	8.1
Ca	5.6						9.2	Ca	7.7	ERR	14.9
Mg	16.0						16.1	Mg	22.0	ERR	26.1
Al	0.0						7.8	Al	31.6	ERR	12.7
NH4	23.0						2.2	NH4	39.8	ERR	3.6
NO3	29.0						16.8	NO3	ERR	ERR	27.3
Cl	78.6						134.1	Cl	108.0	ERR	217.5
SO4	42.2						47.2	SO4	58.0	ERR	76.6
A-	3.2	0	0	0	0	0	2.7	A-	4.4	ERR	4.4
sum+	153.0	0	0	0	0	0	200.8	sum+	210.2	ERR	325.7
sum-	153.0	0	0	0	0	0	200.8	sum-	210.2	ERR	325.7
SBC	118.9	0	0	0	0	0	136.7	SBC	163.3	ERR	221.7
SSA	149.8	0	0	0	0	0	198.1	SSA	205.8	ERR	321.3
alk	-30.9	0	0	0	0	0	-61.4	alk	-42.4	ERR	-100
TOC							3.32	TOC	0.0	ERR	5.4
SiO2							0.69	SiO2	0.0	ERR	1.1
c.d.							0.81	c.d.	0.00	ERR	0.81

Risdalsheia weighted-average concentrations   30-Mar 91
file: ris-all.wq1   ueq/l

EGIL concentrations

	W84	S84	W85	S85	W86	S86	W87	S87	W88	S88	W89	S89	W90
mm	417	547	116	429	128	442	253	850	331	904	615	390	621.2
h	77	109.7	69.0	76.9	62.5	95.0	55.3	84.7	62.5	73.0	66.0	92.1	75.7
na	101	91.4	112.1	65.3	93.8	95.0	90.9	97.6	86.4	58.6	89.9	66.7	106.4
k	10	5.5	17.2	4.7	15.6	9.0	15.8	5.9	8.8	4.4	9.3	2.8	4.8
ca	14	14.6	25.9	11.7	23.4	18.1	23.7	17.6	15.7	15.5	18.4	17.2	15.1
mg	29	23.8	34.5	16.3	31.3	27.1	31.6	23.5	21.1	17.7	23.9	22.1	21.9
al	24	21.9	17.2	9.3	15.6	18.1	7.9	15.3	13.0	10.0	15.0	15.1	13.4
nh4	24	9.1	51.7	14.0	62.5	22.6	55.3	17.6	31.7	19.9	35.9	10.5	11.1
no3	72	36.6	34.5	18.6	46.9	36.2	55.3	31.8	41.4	26.5	39.3	22.8	29.0
cl	91	117.0	146.6	62.9	101.6	113.1	87.0	108.2	89.4	59.7	96.7	77.4	128.1
so4	106	111.5	137.9	88.6	125.0	135.7	122.5	101.2	97.3	77.4	102.4	91.8	90.3
A-	10	11.0	8.6	28.0	31.3	0.0	15.8	21.2	11.2	34.3	19.5	38.5	1.0
SBC	178.0	144.4	241.4	111.9	226.6	171.9	217.4	162.4	163.7	116.2	177.4	119.2	159.4
SSA	269.0	265.1	319.0	170.2	273.4	285.1	264.8	241.2	228.1	163.7	238.5	192.1	247.4
alk	-91.0	-120.7	-77.6	-58.3	-46.9	-113.1	-47.4	-78.8	-64.4	-47.6	-61.1	-72.8	-88.1
SBC*	77.0	14.6	78.7	42.0	113.8	46.4	120.9	42.2	64.5	49.8	70.0	33.3	17.1
SO4*	96.6	99.5	122.8	82.1	114.5	124.1	113.6	90.0	88.1	71.3	92.5	83.8	77.1
TOC	5.3	9.1	10.3	15.1	10.9	10.6	6.8	10.5	6.9	11.7	10.1	11.8	10.1

KIM concentrations

	W84	S84	W85	S85	W86	S86	W87	S87	W88	S88	W89	S89	W90
mm	417	410	153	272	223	307	154	632	208	695	529	410	606
h	89	95.1	65.4	80.9	53.8	84.7	64.9	79.1	48.1	64.7	59.5	78.3	60.6
na	134	82.9	104.6	102.9	85.2	110.7	110.4	80.7	72.1	56.1	66.9	85.4	84.8
k	10	4.9	19.6	7.4	9.0	6.5	13.0	6.3	4.8	4.3	7.9	6.1	5.6
ca	19	12.2	19.6	11.0	13.5	16.3	13.0	11.1	9.6	8.6	7.2	10.5	7.3
mg	31	14.6	26.1	14.7	17.9	26.1	19.5	17.4	14.4	12.9	11.5	16.3	12.5
al	17	4.9	6.5	11.0	4.5	9.8	13.0	9.5	9.6	8.6	8.3	12.7	10.4
nh4	17	2.4	19.6	7.4	17.9	6.5	13.0	4.7	9.6	5.8	8.1	2.9	2.1
no3	62	4.9	13.1	7.4	17.9	16.3	19.5	4.7	9.6	2.9	6.0	4.6	5.6
cl	120	117.1	143.8	125.0	85.2	117.3	136.4	98.1	76.9	66.2	80.9	104.1	97.0
so4	137	73.2	85.0	58.8	53.8	81.4	64.9	50.6	48.1	30.2	35.2	45.6	33.2
A-	0	22.0	19.6	44.1	44.8	45.6	26.0	55.4	38.5	61.9	47.4	57.8	47.5
SBC	211.0	117.1	189.5	143.4	143.5	166.1	168.8	120.3	110.6	87.8	101.7	121.2	112.4
SSA	319.0	195.1	241.8	191.2	157.0	215.0	220.8	153.5	134.6	99.3	122.1	154.4	135.8
alk	-108.0	-78.0	-52.3	-47.8	-13.5	-48.9	-51.9	-33.2	-24.0	-11.5	-20.4	-33.2	-23.4
SBC*	77.8	-12.9	29.9	4.6	48.9	36.0	17.5	11.4	25.2	14.3	11.9	5.6	4.7
SO4*	124.6	61.1	70.2	45.9	45.0	69.4	50.9	40.5	40.2	23.4	26.8	34.9	23.2
TOC	8.4	17.3	15	22.4	14.7	15.4	11.2	16.5	11.5	16.7	14.6	12.4	14.6

ROLF	concentrations											
	S84	W85	S85	W86	S86	W87	S87	W88	S88	W89	S89	W90
mm		489	510	502	886	274	1040	912	822	529	405	709.8
h		85.9	88.2	77.7	102.7	65.7	71.2	59.2	99.8	90.7	123.5	97.9
na		106.3	62.7	93.6	105.0	91.2	84.6	99.8	81.5	141.8	155.6	173.3
k		6.1	2.0	4.0	3.4	7.3	1.9	4.4	3.6	3.8	7.4	8.0
ca		14.3	15.7	17.9	21.4	14.6	15.4	8.8	17.0	20.8	19.8	17.3
mg		26.6	23.5	29.9	29.3	18.2	23.1	14.3	26.8	35.9	37.0	31.0
al		10.2	7.8	12.0	11.3	7.3	13.5	5.5	10.9	20.8	22.2	14.2
nh4		24.5	3.9	25.9	6.8	14.6	3.8	13.2	9.7	5.7	4.9	8.3
no3		53.2	9.8	41.8	21.4	29.2	10.6	24.1	14.6	34.0	27.2	31.4
cl		94.1	90.2	103.6	146.7	69.3	119.2	89.9	80.3	179.6	190.1	225.4
so4		130.9	78.4	99.6	112.9	91.2	62.5	65.8	104.6	100.2	116.0	90.2
A-		-4.1	25.5	15.9	0.0	29.2	21.2	24.1	49.9	7.6	39.5	3.1
SBC		177.9	107.8	171.3	165.9	146.0	128.8	140.4	138.7	207.9	224.7	238.0
SSA		278.1	178.4	245.0	281.0	189.8	192.3	179.8	199.5	313.8	333.3	347.0
alk		-100.2	-70.6	-73.7	-115.1	-43.8	-63.5	-39.5	-60.8	-105.9	-108.6	-109.0
SBC*		73.5	7.7	56.3	3.0	69.0	-3.5	40.5	49.6	8.6	13.7	-12.3
SO4*		121.2	69.1	88.9	97.8	84.1	50.2	56.5	96.4	81.7	96.5	66.9
TOC		7.4	18.2	8.4	11.1	10.2	9.7	8.1	15.7	6.3	8.9	6.3

EGIL	year June-June		concentrations				
	83-84	84-85	85-86	86-87	87-88	88-89	89-90
	pre						
mm	417	663	557	695	1181	1519	1011.2
h	77	103	74	81	78	70	82
na	101	95	72	94	94	71	91
k	10	8	7	12	7	6	4
ca	14	17	14	20	17	17	16
mg	29	26	20	29	23	20	22
al	24	21	11	14	15	12	14
nh4	24	17	25	35	22	26	11
no3	72	36	25	43	34	32	27
cl	91	122	72	104	103	75	109
so4	106	116	97	131	100	88	91
A-	10	11	29	6	18	28	15
SBC	178.0	161	138	188	163	141	144
SSA	269.0	275	194	278	238	194	226
alk	-91.0	-113	-56	-89	-75	-53	-82
SBC*	77.0	26	59	73	48	58	23
SO4*	96.6	104	90	120	89	80	80
TOC	5.3	9.3	14.1	9.2	9.5	11.1	10.8

KIM

	83-84 pre	84-85	85-86	86-87	87-88	88-89	89-90
mm	417	563	495	461	840	1224	1016
h	89	90	75	77	70	63	67
na	134	87	99	111	78	60	85
k	10	7	8	9	6	6	6
ca	19	13	12	15	11	8	9
mg	31	17	15	24	17	12	14
al	17	5	10	11	10	9	11
nh4	17	5	10	9	6	7	2
no3	62	6	10	17	6	4	5
cl	120	122	116	124	92	72	100
so4	137	75	58	75	50	32	38
A-	0	22	44	38	51	56	51
SBC	211.0	130	143	167	118	93	116
SSA	319.0	203	183	217	148	109	143
alk	-108.0	-74	-40	-50	-31	-15	-27
SBC*	77.8	-5	15	29	15	13	5
SO4*	124.6	63	46	63	40	25	28
TOC	8.4	16.9	20.6	13.9	15.1	15.8	13.8

ROLF

	85-86	86-87	87-88	88-89	89-90
mm	1012	1160	1952	1351	1114.8
h	86	89	68	96	108
na	70	100	89	106	166
k	2	5	3	4	8
ca	16	19	14	19	18
mg	25	25	21	30	33
al	9	10	11	15	17
nh4	9	10	6	8	7
no3	17	24	14	22	30
cl	93	119	111	120	212
so4	83	105	63	103	100
A-	23	11	22	33	17
SBC	122	159	132	167	233
SSA	194	248	189	246	342
alk	-71	-89	-57	-79	-109
SBC*	19	27	9	33	-2
SO4*	74	93	52	90	78
TOC	15.9	10.8	9.3	11.9	7.3

APPENDIX 10

Appendix 10. Risdalsheia. CO_2 in soil air

CO2 in soil air. Risdalsheia 1988. Units: % atm.

Date	KIM				ROLF				EGIL			
	1	2	3	avg.	1	2	3	avg.	1	2	3	avg.
88-06-10	0.17	0.18	0.19	0.16	0.2	0.1	0.1	0.18	0.1	3.5		0.10
88-06-23	0.16	0.21	0.22	0.15	0.2	0.1	0.1	0.16	0.12	1.3	0.8	0.13
88-07-14	0.16	0.19	0.15	0.18	0.15	0.11	0.11	0.18	0.08			0.12
88-08-04	0.14	0.21	0.22	0.18	0.13	0.2	0.15	0.22	0.18			0.12
88-08-18	0.24	0.27	0.32	0.21	0.27	0.22	0.16	0.26	0.1			0.09
88-09-09	0.16	0.26	0.25	0.15	0.25	0.21	0.14	0.19	0.08			0.07
88-09-22	0.22	0.27	0.3	0.16	0.25	0.13	0.09	0.12	0.08	4.9		1.67
88-10-20	0.08	0.07		0.08	0.07	0.04	0.06	0.06	0.04			0.04

CO2 in soil air. Risdalsheia 1989. Units: %atm.

Date	KIM				ROLF				EGIL			
	1	2	3	avg.	1	2	3	avg.	1	2	3	avg.
89-05-26	0.17	0.18	0.21	0.19	0.07	0.08	0.10	0.08	0.06	0.5	3	1.19
89-06-08	0.09	0.14	0.16	0.13	0.07	0.09	0.08	0.08	0.50	0.09		0.30
89-06-22	0.15	0.14	0.11	0.13	0.06	0.05	0.08	0.06	0.50	0.09	2	0.86
89-07-06	0.09	0.11	0.14	0.11	0.04	0.06	0.06	0.05	0.08	1.5	0.3	0.63
89-07-20	0.1	0.14	0.15	0.13	0.10	0.08	0.06	0.08	0.14	0.5	0.27	0.30
89-08-04	0.09	0.1	0.11	0.10	0.04	0.05	0.05	0.05	0.10	0.12		0.11
89-08-18	0.17	0.2	0.2	0.19	0.08	0.10	0.12	0.10	0.13			0.13
89-09-01	0.16	0.15		0.16	0.13	0.10	0.10	0.11	0.10			0.10
89-09-13	0.16	0.2	0.2	0.19	0.18	0.08	0.08	0.11	5.20	0.4	0.1	1.90
89-10-05	0.15	0.17	0.16	0.16	0.16	0.08	0.07	0.10	0.35	4	0.09	1.48
89-10-19	0.13	0.13	0.15	0.14	0.07	0.09		0.08	0.06			0.06

CO2 in soil air. Risdalsheia 1990. Units: %atm.

Date	KIM				ROLF				EGIL			
	1	2	3	avg.	1	2	3	avg.	1	2	3	avg.
90-05-16	0.14	0.14	0.28	0.19	0.06	0.07	0.08	0.07	0.06			0.06
90-05-31	0.15	0.2	0.22	0.19	0.08	0.12	0.15	0.12	0.1	0.76	2.8	1.22
90-06-14	0.2	0.23	0.45	0.29	0.08	0.08	0.09	0.08	0.1	1.3	4.5	1.97
90-06-28	0.13	0.45		0.29	0.1	0.11		0.11	0.11			0.11
90-07-11	0.18	0.2	0.2	0.19	0.08	0.15	0.2	0.14	0.14			0.14
90-07-27	0.25	0.3	0.35	0.30	0.13	0.14	0.27	0.18	0.15	0.5	2.5	1.05
90-08-08	0.15	0.17	0.22	0.18	0.08	0.09	0.11	0.09	0.16	0.26	0.45	0.29
90-08-23	0.17	0.19	0.2	0.19	0.15	0.15	0.16	0.15	0.13	0.17		0.15
90-09-07	0.12	0.12		0.12	0.11	0.11	0.12	0.11	0.08			0.08
90-09-20	0.11	0.11	0.12	0.11	0.04	0.06	0.11	0.07	0.12	0.09		0.11
90-10-11	0.09	0.1	0.11	0.10	0.08	0.09	0.09	0.09	0.06			0.06

APPENDIX 11

Appendix 11. RAIN publication list. March 1991

Wright, R.F. 1985. RAIN project. Annual report for 1984. Acid Rain Res. Rept. 7/1985 (Norwegian Institute for Water Research, Oslo), 39 pp.

Lotse, E., and E. Otabbong, 1985. Physiochemical properties of soils at Risdalsheia and Sogndal. RAIN project. Acid Rain Res. Rept. 8/1985 (Norwegian Institute for Water Research, Oslo), 48 pp.

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Wright, R.F. and E. Gjessing 1986. RAIN project. Annual report for 1985. Acid Rain Res. Rept. 9/1986 (Norwegian Institute for Water Research, Oslo), 33 pp.

Wright, R.F., E. Gjessing, A. Semb and B. Sletaune. 1986. RAIN project. Data report 1983-85. Acid Rain Res. Rept. 10/86 (Norwegian Institute for Water Research, Oslo), 62 pp.

Wright, R.F. and B. J. Cosby, 1987. Use of a process-oriented model to predict acidification at manipulated catchments in Norway. Atmos. Environ. 21: 727-730.

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Hauhs, M. 1986. Relation between chemistry of soil solution and runoff in two contrasting watersheds: Lange Bramke (West Germany) and Risdalsheia (Norway), p. 207-217, In S. Haldorsen and E.J. Berntsen (eds.) Water in the Unsaturated Zone (Nordic Hydrologic Programme Report 15, P.O. Box 5091, 0301 Oslo), 284 pp.

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Parmann, G. 1988. Det nytter å redusere sur nedbør. Populærvitenskapelig Magasin 3/88: 8-11 (in Norwegian).

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Wright, R.F., Norton, S.A., Brakke, D.F and Frogner, T. 1988. Experimental verification of episodic acidification of freshwaters by seasalts. Nature 334: 422-424.

Wright, R.F., Lotse, E., and Semb, A. 1988. Reversibility of acidification shown by whole-catchment experiments. Nature 334: 670-675.

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Wright, R.F. in press, RAIN projects. Annual report for 1988, 1989 and 1990. Acid Rain Research Report 24/91 (Norwegian Institute for Water Research, Oslo, Norway).

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6/1984 Wright, R.F. 1984. Changes in the chemistry of Lake Hovvatn, Norway, following liming and reacidification. 68 pp.

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8/1985 *Lotse, E.* and *Otabbong, E.* 1985. Physiochemical properties of soils at Risdalsheia and Sogndal: RAIN project. 48 pp.

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20/1990 Skjelkvåle, B.L. and Wright, R.F. 1990. Overview of areas sensitive to acidification: Europe. 20 pp.

21/1990 Hindar, A. 1990. Chemistry and fish status of 67 acidified lakes at the coast of Aust-Agder, Southern Norway, in relation to postglacial marine deposits. 47 pp.

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