



IN REPLY REFER TO:
N3615

United States Department of the Interior

NATIONAL PARK SERVICE

ALASKA REGIONAL OFFICE
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892



Memorandum

To: Resource Management Specialists, Alaska Region
From: Air Quality Coordinator, Alaska Region
Subject: Compilation of Stack-Filter Unit Particulate Reports

Enclosed are copies of all the SFU particulate reports for your area that are on file in the RNR library, and a table summarizing the available reports for all parks participating in the program. If you have any reports for periods in which none are on file, please send a copy to me.

Each park received two reports for the summer of 1988. The data is different on the two reports, and in most cases the graphs are of different scales. I have sent a letter to Crocker Nuclear Laboratories requesting three things:

- (1) An explanation regarding the two different reports
- (2) Identification of the reports which should be used
- (3) A cross-check of the our summary table with their records to ensure that we have received all completed reports

I will contact as soon as their response is received. If you have any questions please contact me.

Brad Cella

Brad Cella

Enclosures

cc:

BELA
DENA
GAAR
KATM
NWAK
WRST
YUCH

AIR QUALITY
STACK-FILTER PARTICULATE SAMPLING UNIT
SUMMARY OF PARTICULATE REPORTS BY AREA

X = REPORT ON FILE

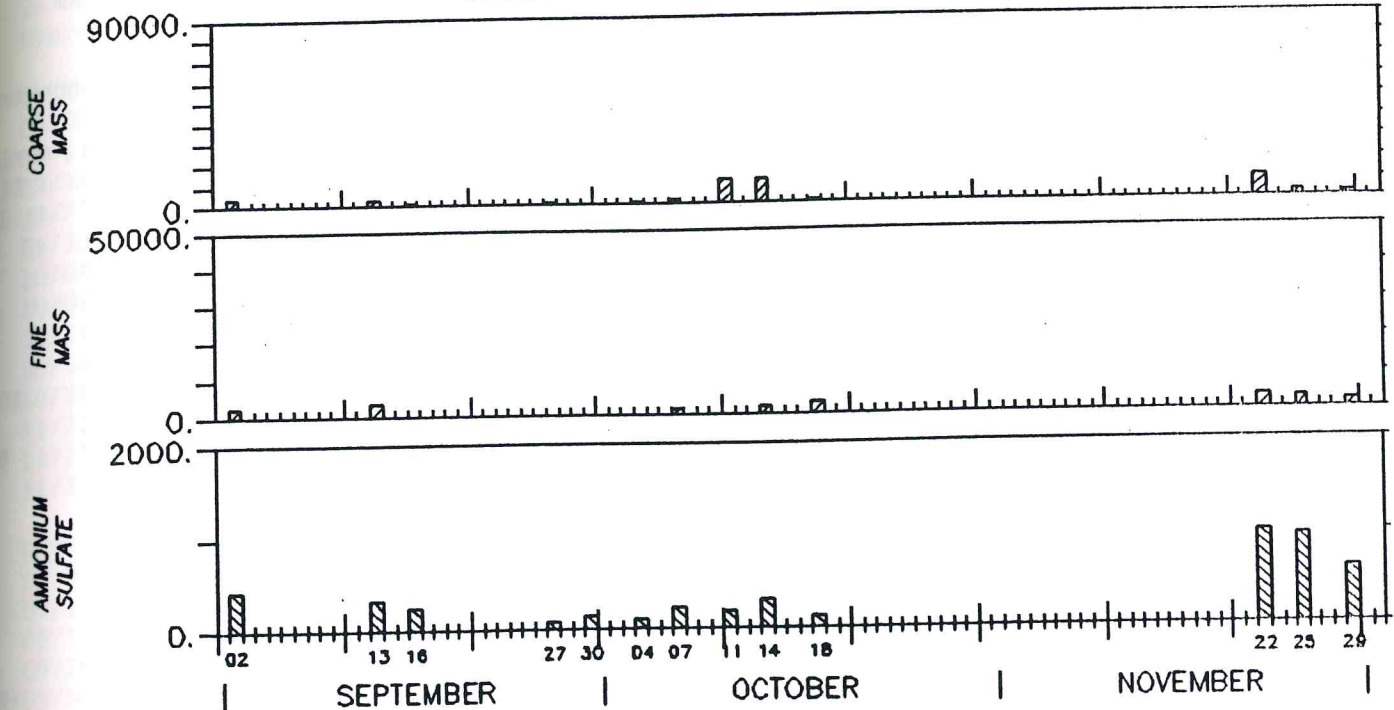
- = REPORT NOT ON FILE

REPORT PERIOD	DENA	KATM	GAAR	BELA	WRST	NWAK
Sprg 86	-	-	-	-	-	-
Summ 86	-	-	-	-	-	X
Fall 86	X	-	-	-	-	X
Wint 86	X	-	-	-	-	X
Sprg 87	X	-	-	X	-	X
Summ 87	X	X	X	X	X	X
Fall 87	X	X	X	X	X	X
Wint 87	-	X	X	X	X	X
Sprg 88	X	-	X	X	X	X
Summ 88*	X	X	X	X	X	X
Fall 88	-	X	X	-	X	X
Wint 88	-	X	-	X	X	X
Sprg 89	-	X	X	X	X	X
Summ 89	-	-	X	X	X	X
Fall 89	-	X	X	X	X	X
TOTAL RECEIVED	7	8	9	10	10	14

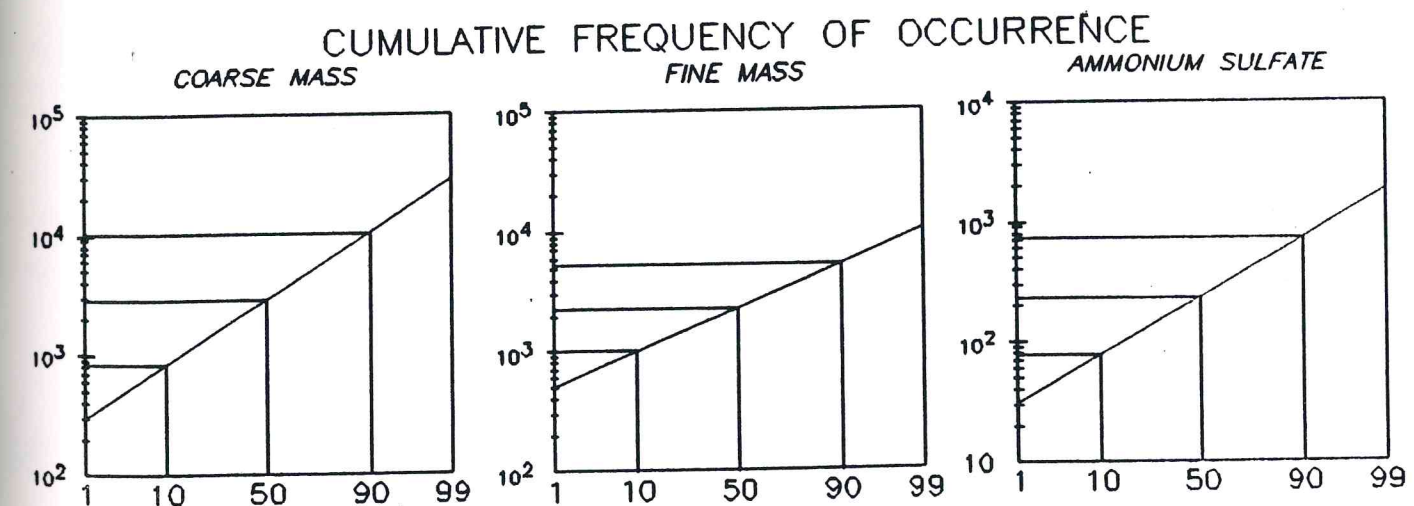
* The IMPROVE air quality sampling unit was installed at DENA.

-NOV-90 14:34:52

FALL 1989 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK



Each bar in the plot represents the average 24-hour concentration expressed as mass/unit volume (ng/m^3). Coarse mass is the concentration of all particles with diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visisbility reduction is due to the scattering of light from these fine particles.



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	821.1	2903.7	10269.2
FINE MASS	994.2	2292.5	5285.8
AMM. SULFATE	76.8	236.6	728.8

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

	cases found	arithmetic mean concentrations				distribution of concentrations		
		SEP	OCT	NOV	season	minimum	median	maximum
MC	12	2290	5838	5335	4357	724	2675	11801
MF	8	1827	1895	2941	2155	693	2197	3550
H	13	47	37	91	54	21	41	127
AL	10	3	24	17	14	2	6	71
SI	12	13	93	49	52	1	25	253
S	13	57	44	206	87	16	59	242
K	13	4	9	15	8	2	6	20
CA	13	4.5	28.0	15.5	16.1	1.2	8.6	104.6
TI	13	1	3	2	2	1	2	8
FE	13	3.7	33.1	19.1	18.6	1.5	9.7	99.1
NI	4	INSUFFICIENT DATA						
CU	4	INSUFFICIENT DATA						
ZN	12	0.6	0.9	1.6	0.9	0.2	0.9	2.1
AS	3	INSUFFICIENT DATA						
SE	2	INSUFFICIENT DATA						
BR	8	0.8	0.5	0.9	0.7	0.2	0.6	1.8
PB	10	1.8	1.0	2.3	1.6	0.5	1.3	4.9
LR	8	158.3	84.3	315.7	189.6	61.9	161.6	409.8
NHSO	13	235.4	183.3	850.9	357.4	67.3	245.0	1000.1
OMH	13	363.6	288.1	438.7	351.9	184.2	278.9	799.3
SOIL	13	58.9	416.4	234.6	236.9	14.3	122.0	1212.8
KNON	8	2.7	1.3	6.1	3.2	0.9	2.5	7.8

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.
"OMH" IS ORGANIC MASS FROM HYDROGEN
"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.
"KNON" IS NONSOIL POTASIUM, ESTIMATED FROM FE AND K.
"LR" IS THE COEFFICIENT OF ABSORPTION($10^{-8} M^{-1}$)

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm.
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

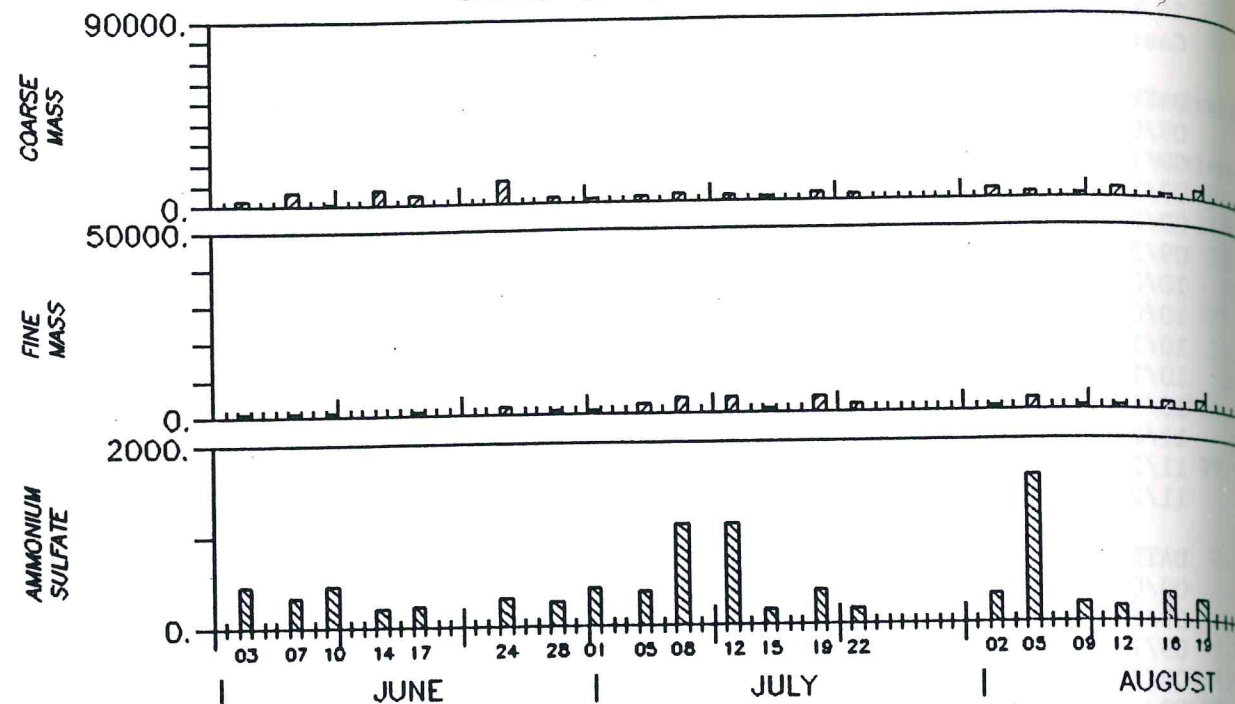
DATE	C.MASS	F.MASS	H	AL	SI	S	K	CA	TI
09/02	4494	2497	98	6	37	102	6	12	2
09/13	3251	3393	48	2*	6	76	5	2	1
09/16	1657	N/A	40	5	16	59	5	5	2
09/27	1323	693*	21	2*	1*	16	3	1	1
09/30	724*	724*	30	3	6	31	3	2	1
10/04	1531	693*	30	4	9	25	2	4	1
10/07	2675	1549	33	9	26	51	6	10	2
10/11	11801	N/A	41	36	152	44	10	12	4
10/14	11620	2072	44	71	253	74	20	105	8
10/18	1562	3265	39	2*	24	29	3	9	1
11/22	10720	3550	127	23	73	242	14	25	3
11/25	3299	3074	77	15	49	230	19	16	2
11/29	1985	2197	70	12	25	146	11	5	2

DATE	FE	NI	CU	ZN	AS	SE	BR	PB	LR
09/02	10	0.5	0.2*	0.6	0.2	0.2*	1.0	1.3	203.8
09/13	2	0.2*	0.2*	0.2*	0.2*	0.4	0.6	0.6*	112.8
09/16	4	0.7	0.2*	0.9	0.2*	0.2*	0.3*	1.7	N/A
09/27	2	0.2*	0.2*	0.7	0.2*	0.3	0.2*	0.5*	N/A
09/30	1	0.2*	0.2*	0.6	0.2*	0.2*	1.8	4.9	N/A
10/04	2	0.2*	0.6	0.8	0.2*	0.2*	0.2*	0.8	N/A
10/07	8	0.3*	0.3*	0.8	0.2*	0.2*	0.6	0.8	61.9
10/11	47	0.2*	0.7	0.9	0.4	0.2*	0.7	0.5*	N/A
10/14	99	0.5	0.3*	1.0	0.2*	0.2*	0.7	1.6	119.3
10/18	10	0.4	0.2	0.9	0.2*	0.2*	0.2*	1.3	71.6
11/22	29	0.3*	0.3*	2.1	0.3	0.2*	0.7	1.5	409.8
11/25	18	0.3*	0.3*	1.8	0.3*	0.3*	1.8	3.0	315.5
11/29	10	0.2*	0.3	1.0	0.2*	0.2*	0.2*	2.4	221.8

*analytical minimum detectable limit; actual concentration is less than this amount.

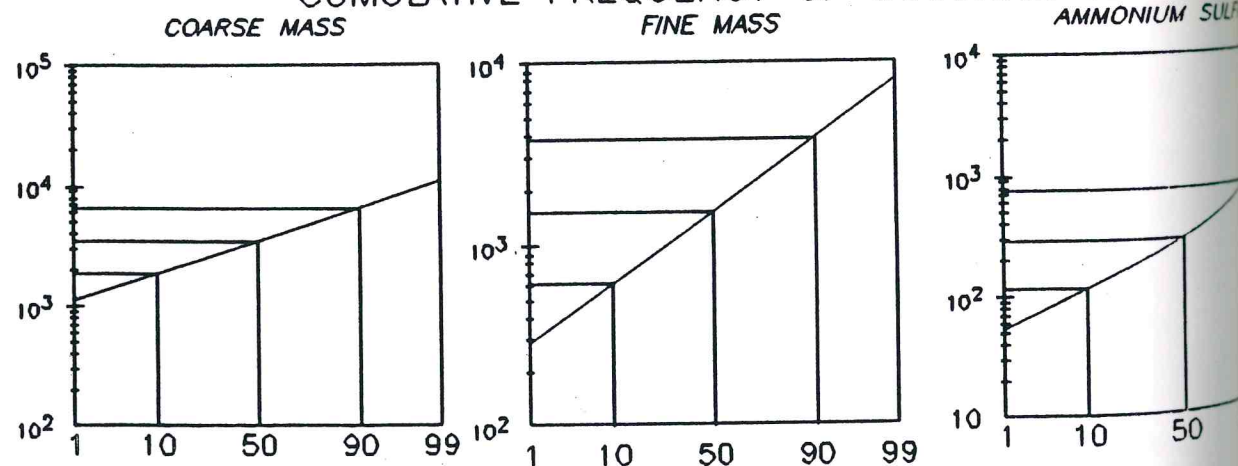
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SUMMER 1989 PARTICULATE REPORT FOR GATES OF THE ARCTIC NATIONAL PARK



Each bar in the plot represents the average 24-hour concentration expressed mass/unit volume (ng/m^3). Coarse mass is the concentration of all particles diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.

CUMULATIVE FREQUENCY OF OCCURRENCE



The cumulative frequency plots show the percentage of observations that exceeded a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	1898.5	3548.0	6630.7
FINE MASS	613.4	1528.2	3807.6
AMM. SULFATE	115.2	295.0	755.5

GATES OF THE ARCTIC NATIONAL PARK
15-NOV-90

JUN 1989 - AUG 1989

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$. Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

	cases found	arithmetic mean concentrations				distribution of concentrations		
		JUN	JUL	AUG	season	minimum	median	maximum
MC	21	5734	3511	3793	4346	1594	3697	11673
MF	20	1128	2704	1632	1822	695	1109	4210
H	21	59	117	86	87	46	61	210
AL	10	5	4	4	4	1	2	15
SI	21	39	29	15	28	4	21	70
S	21	76	127	103	102	37	73	386
K	21	7	13	8	9	3	8	20
CA	19	5.3	5.4	2.1	4.3	0.5	3.9	14.7
TI	11	1	1	0	1	0	1	2
FE	21	12.0	8.2	3.1	7.8	1.4	5.4	21.4
NI	4				INSUFFICIENT DATA			
CU	15	2.0	1.0	14.5	5.8	0.2	0.6	78.3
ZN	19	2.1	1.2	11.9	5.1	0.2	0.9	63.6
AS	2				INSUFFICIENT DATA			
SE	1				INSUFFICIENT DATA			
BR	20	0.8	1.0	0.6	0.8	0.3	0.8	1.4
PB	14	0.9	1.0	1.5	1.1	0.4	1.0	4.2
LR	21	186.2	278.5	183.1	216.0	68.7	164.7	535.4
NHSO	21	314.5	523.3	425.9	421.2	152.3	303.0	1591.9
OMH	21	437.6	941.3	658.8	679.2	274.0	462.2	1579.2
SOIL	21	149.1	110.1	58.2	105.8	31.1	74.9	240.6
KNON	16	3.2	9.0	6.1	6.6	1.5	5.6	13.6

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

"OMH" IS ORGANIC MASS FROM HYDROGEN

"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.

"KNON" IS NONSOIL POTASSIUM, ESTIMATED FROM FE AND K.

"LR" IS THE COEFFICIENT OF ABSORPTION (10^{-8}m^{-1})

SFU PARTICULATE NETWORK

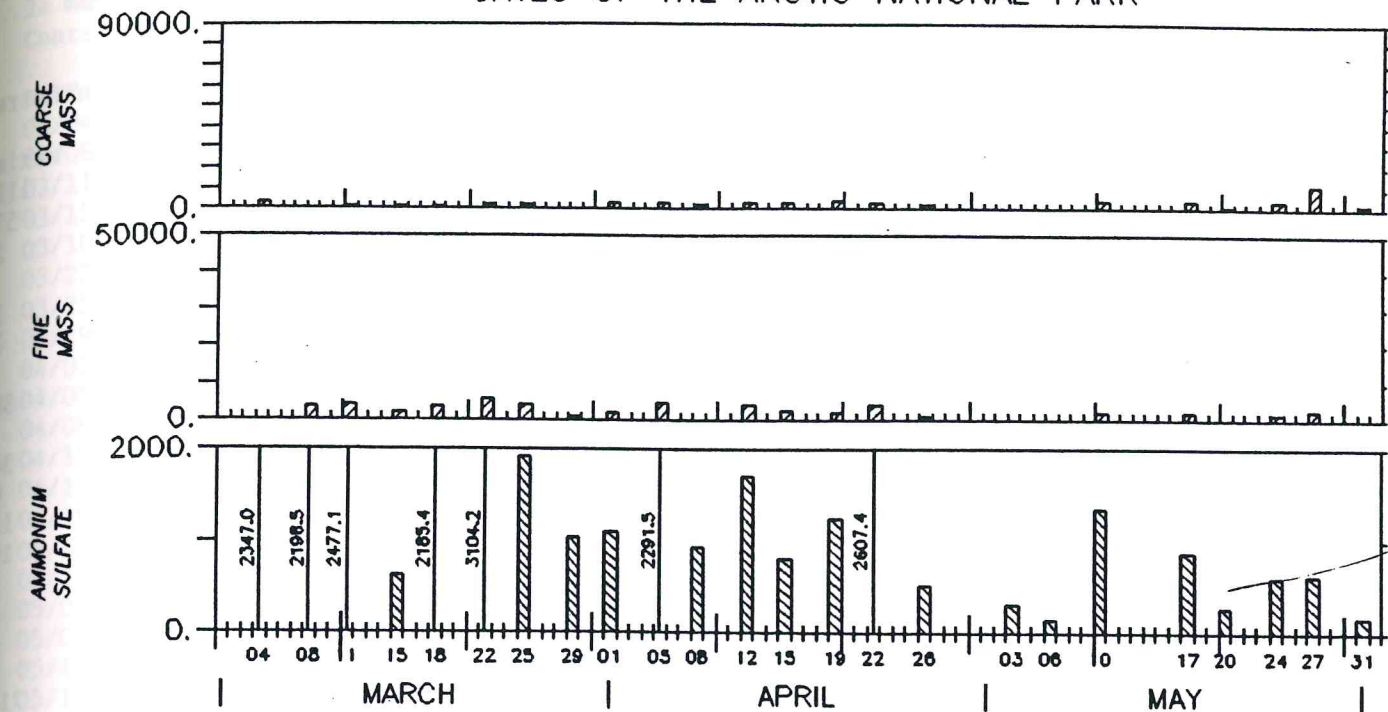
24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

DATE	C.MASS	F.MASS	H	AL	SI	S	K	CA	TI
06/03	3162	825	61	15	37	110	8	8	1
06/07	7005	1083	60	2*	55	77	7	6	2
06/10	1594	1109	53	1*	21	111	3	4	0
06/14	8016	699*	49	1*	51	49	8	6	2
06/17	5399	961	54	6	16	51	9	4	1*
06/24	11673	2122	60	2*	70	72	8	5	1
06/28	3290	1097	75	8	27	64	7	5	1
07/01	2096	978	63	2*	41	99	6	9	1*
07/05	3602	2613	131	2*	45	91	16	6	1
07/08	4417	4210	210	2*	37	267	20	4	1*
07/12	3697	4194	171	2*	51	264	17	15	1
07/15	2727	979	47	3	7	38	8	1*	0*
07/19	4522	4020	136	10	14	89	12	3	1*
07/22	3513	1936	62	8	4	40	8	1*	0*
08/02	5283	765	57	8	6	73	7	2	1
08/05	3017	2797	145	1*	20	386	5	1	0*
08/09	2084	695	52	4	16	47	7	2	0
08/12	4648	1056	46	9	24	37	9	5	1*
08/16	2672	1898	87	2	16	74	6	1	0*
08/19	5036	2734	157	1*	13	54	15	2	0*
08/30	3811	1482	55	1*	12	51	7	2	1

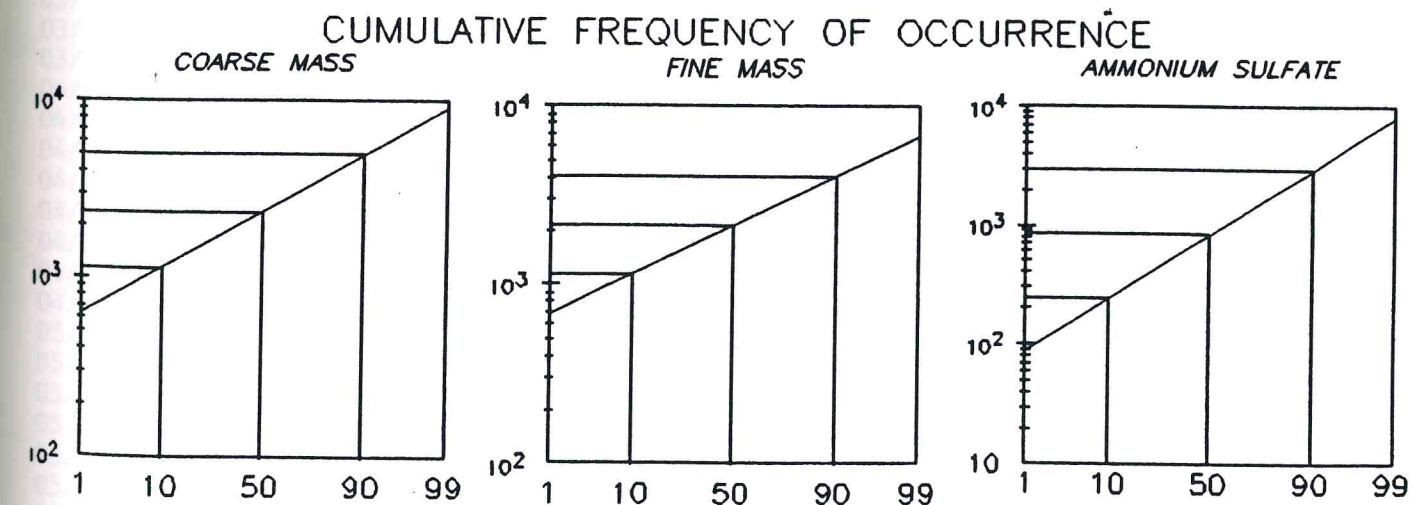
DATE	FE	NI	CU	ZN	AS	SE	BR	PB	LR
06/03	11	0.2*	0.2*	0.7	0.2*	0.2*	1.0	1.1	161.7
06/07	17	0.2*	0.4	1.8	0.3	0.2*	0.6	0.8	462.3
06/10	5	0.2*	3.7	3.2	0.2*	0.2*	0.7	0.4*	164.7
06/14	17	0.2*	1.2	0.8	0.2*	0.2*	0.6	0.6*	84.5
06/17	5	1.4	0.2*	0.9	0.2*	0.2*	1.0	0.6*	121.9
06/24	21	0.3*	8.1	6.6	0.2*	0.2*	0.8	0.8	135.6
06/28	7	0.2*	0.2*	0.7	0.2*	0.3	1.2	1.9	173.1
07/01	11	0.2*	2.3	1.9	0.2*	0.2*	1.2	1.2	182.9
07/05	12	0.3*	0.6	0.7	0.2*	0.3*	0.9	0.7*	383.7
07/08	10	0.2*	0.2*	1.1	0.2*	0.2*	1.3	1.2	535.4
07/12	18	0.2*	0.4	0.9	0.3	0.2*	1.4	1.1	372.2
07/15	2	0.2*	0.2*	0.2*	0.2*	0.2*	1.0	0.7	101.0
07/19	2	0.3*	0.8	1.0	0.2*	0.3*	0.3*	1.0	247.4
07/22	1	0.2*	2.7	2.5	0.2*	0.2*	0.8	1.0	127.0
08/02	3	0.2*	1.5	1.4	0.2*	0.2*	0.6	1.0	123.7
08/05	3	0.6	0.6	0.2*	0.2*	0.2*	0.6	0.5*	229.1
08/09	3	0.3	0.2*	0.5	0.2*	0.2*	0.6	1.1	134.1
08/12	5	0.2*	0.3	0.8	0.2*	0.2*	0.4	0.6*	85.4
08/16	2	0.2*	78.3	63.6	0.2*	0.2*	0.8	4.2	218.7
08/19	3	0.2*	19.7	16.5	0.2*	0.2*	0.9	2.3	422.1
08/30	2	0.8	0.5	0.3	0.2*	0.2*	0.5	0.6*	68.7

*analytical minimum detectable limit; actual concentration is less than this amount

9-MAY-90 11:47:40

SPRING 1989 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK

Each bar in the plot represents the average 24-hour concentration expressed as mass/unit volume (ng/m^3). Coarse mass is the concentration of all particles with diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	1142.6	2384.9	4978.0
FINE MASS	1141.0	2150.4	4052.7
AMM. SULFATE	242.3	841.3	2920.6

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

	cases found	arithmetic mean concentrations				distribution of concentrations		
		MAR	APR	MAY	season	minimum	median	maximum
MC	21	1726	3024	3602	2784	682	2465	11266
MF	18	3420	2621	1295	2403	663	1999	5769
H	24	142	106	57	102	20	89	205
AL	20	24	16	14	18	1	19	43
SI	24	76	59	45	60	8	56	122
S	24	481	340	130	317	32	258	753
K	23	22	14	7	14	1	13	33
CA	24	19.2	12.6	9.2	13.7	1.1	14.0	30.9
TI	24	3	2	2	3	1	2	5
FE	24	22.4	17.0	12.8	17.4	1.5	16.3	34.2
NI	7	0.4	0.2	0.3	0.3	0.2	0.3	0.7
CU	18	0.5	0.8	2.8	1.4	0.2	0.4	12.9
ZN	24	3.1	1.8	2.9	2.6	0.5	1.8	10.8
AS	3	INSUFFICIENT DATA						
SE	3	INSUFFICIENT DATA						
BR	23	1.7	1.6	1.4	1.6	0.3	1.4	4.1
PB	21	3.7	1.8	1.7	2.4	0.5	2.1	7.9
LR	18	470.5	360.7	212.6	370.5	109.7	292.1	711.1
NHSO	24	1982.1	1401.6	537.4	1307.1	130.6	1063.5	3104.2
OMH	24	239.9	231.4	272.5	247.9	75.8	240.4	440.4
SOIL	24	332.1	249.1	194.0	258.4	34.2	250.4	523.3
KNON	20	8.5	4.5	1.8	5.4	0.2	4.0	15.8

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.
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SFU PARTICULATE NETWORK

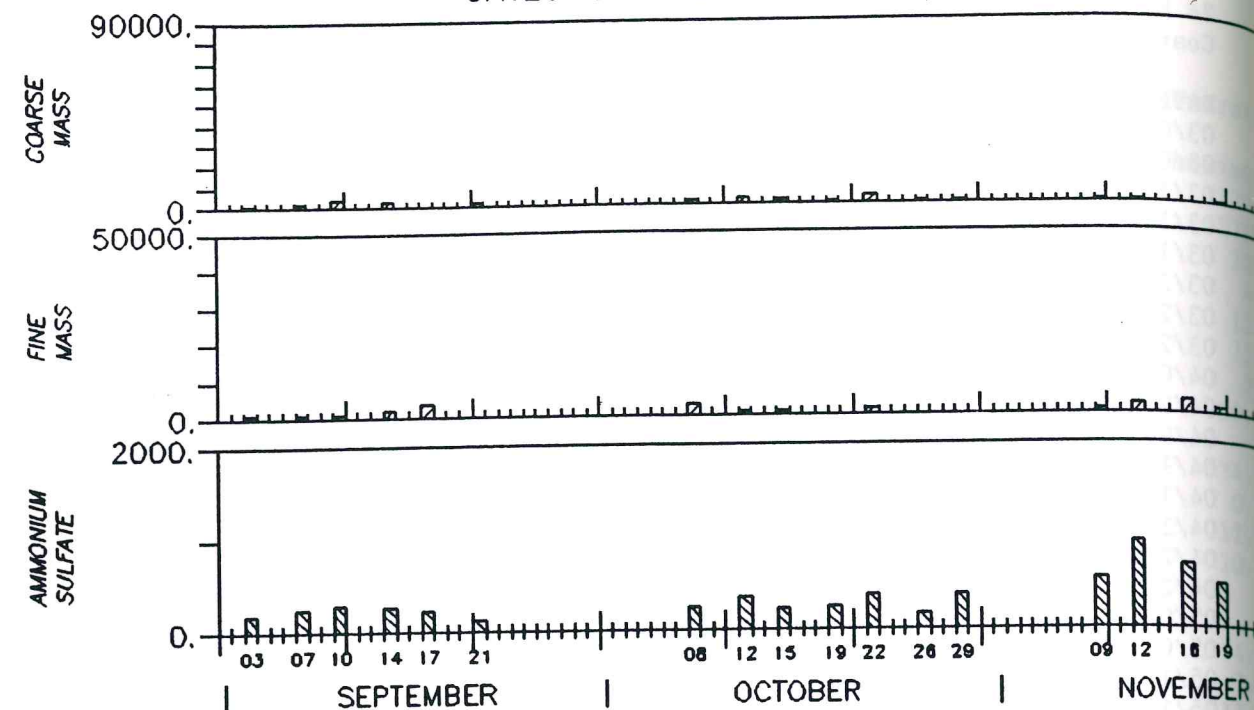
24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm.
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

DATE	C.MASS	F.MASS	H	AL	SI	S	K	CA	TI
03/04	2864	N/A	175	8	37	569	24	23	3
03/08	714*	3627	151	3*	50	533	21	12	2
03/11	1114	4109	171	19	56	600	20	14	3
03/15	1827	1754	55	20	57	150	13	14	2
03/18	1546	3583	159	43	115	530	25	31	3
03/22	2462	5769	205	39	119	753	33	21	5
03/25	2468	4210	133	41	122	461	28	27	3
03/29	813	887	87	17	51	248	13	12	4
04/01	2915	2221	92	29	106	267	20	20	4
04/05	3491	4346	175	13	65	556	19	16	4
04/08	2390	663*	70	2*	42	226	10	8	2
04/12	3355	3938	136	10	49	414	19	10	2
04/15	2790	2524	74	24	78	197	13	15	2
04/19	4017	1942	84	23	62	300	10	13	2
04/22	3089	4231	177	19	56	632	16	14	3
04/26	2141	1105	38	7	16	125	5	4	1
05/03	682*	682*	32	2	8	74	2	1	2
05/06	685*	685*	20	1*	9	32	2	1	2
05/10	3791	1999	105	20	63	328	13	15	2
05/17	4359	1771	92	27	97	211	14	30	3
05/20	1715	717*	29	2*	20	66	1*	2	2
05/24	4243	1295	60	20	47	145	9	6	3
05/27	11266	2496	78	33	111	151	14	17	5
05/31	2073	719*	43	5	9	36	4	1	2

DATE	FE	NI	CU	ZN	AS	SE	BR	PB	LR
03/04	13	0.7	0.7	3.4	0.4*	0.4*	4.1	4.0	N/A
03/08	17	0.3*	0.7	3.5	0.5	0.3*	1.4	3.3	538.2
03/11	17	0.5	0.4	3.0	0.3	0.2*	1.3	2.8	512.7
03/15	15	0.2*	0.4	1.0	0.2*	0.2*	1.7	3.5	241.2
03/18	34	0.3	0.5	4.9	0.7	0.2*	1.8	2.8	553.9
03/22	34	0.4	0.4	4.4	0.2*	0.3*	1.1	7.9	711.1
03/25	33	0.3*	0.3*	2.8	0.2*	0.3*	0.8	3.4	501.5
03/29	15	0.6	0.3*	1.5	0.3*	0.3*	1.2	2.0	234.5
04/01	31	0.3*	0.2*	1.5	0.2*	0.2*	1.4	2.1	295.8
04/05	20	0.3*	0.7	2.3	0.2*	0.3*	1.9	2.8	587.0
04/08	10	0.3*	0.4	1.2	0.2*	0.2*	1.5	1.9	N/A
04/12	13	0.3*	0.5	1.7	0.2*	0.3*	1.3	2.5	479.0
04/15	20	0.2*	0.4	1.5	0.2*	0.2*	1.2	1.3	261.6
04/19	18	0.2*	3.6	3.8	0.2*	0.2*	1.5	1.3	288.4
04/22	19	0.3*	0.3	1.9	0.2*	0.2	2.1	2.1	503.5
04/26	5	0.2*	0.2*	0.5	0.2*	0.2*	1.4	0.5*	109.7
05/03	2	0.2*	0.4	0.8	0.2*	0.2*	0.7	1.2	N/A
05/06	2	0.5	0.2*	0.6	0.2*	0.3	0.9	1.6	N/A
05/10	15	0.2*	0.2*	1.3	0.2*	0.2*	3.0	2.2	263.7
05/17	29	0.3*	6.4	5.8	0.2*	0.3*	1.9	1.4	227.2
05/20	6	0.3*	0.3	0.5	0.2*	0.3*	1.1	0.7*	N/A
05/24	13	0.3*	12.9	10.8	0.2*	0.4	1.7	1.8	134.3
05/27	33	0.3*	1.9	2.6	0.2*	0.3*	1.9	4.1	225.0
05/31	1	0.5	0.4	0.7	0.2*	0.3*	0.3*	0.7*	N/A

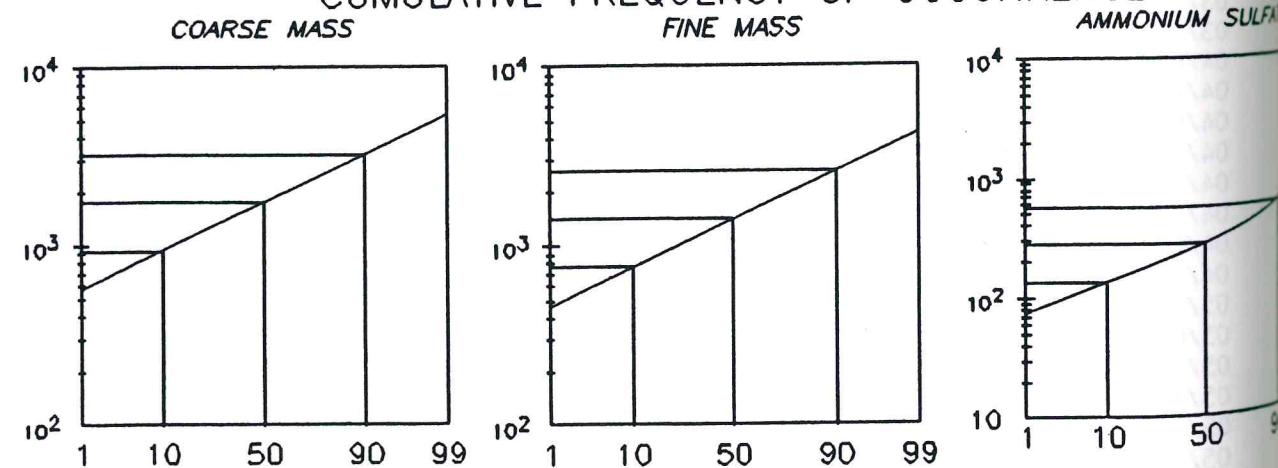
*analytical minimum detectable limit; actual concentration is less than this amount.

21-MAY-90 10:14:36

FALL 1988 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK

Each bar in the plot represents the average 24-hour concentration expressed mass/unit volume (ng/m^3). Coarse mass is the concentration of all particles diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.

CUMULATIVE FREQUENCY OF OCCURRENCE



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	934.1	1738.8	3236.5
FINE MASS	764.3	1413.1	2612.9
AMM. SULFATE	134.0	277.7	575.6

GATES OF THE ARCTIC NATIONAL PARK
21-MAY-90

SEP 1988 - NOV 1988

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$. Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

		arithmetic mean concentrations				distribution of concentrations		
	cases found	SEP	OCT	NOV	season	minimum	median	maximum
MC	16	2658	2260	1289	2092	693	1827	4363
MF	13	1378	1257	2131	1505	693	1145	3394
H	17	59	47	88	63	4	63	109
AL	5	22	5	10	12	2	4	107
SI	18	102	23	39	54	4	34	432
S	18	52	67	154	86	26	67	227
K	17	9	5	8	7	2	6	24
CA	15	9.1	3.5	6.9	6.3	1.1	4.4	37.0
TI	16	5	2	2	3	1	2	14
FE	17	22.0	5.3	9.5	12.0	0.8	5.9	102.3
NI	1				INSUFFICIENT DATA			
CU	18	3.3	1.1	10.6	4.5	0.6	1.6	34.5
ZN	15	3.8	1.6	9.5	4.5	0.3	2.5	27.1
AS	2				INSUFFICIENT DATA			
SE	0				INSUFFICIENT DATA			
BR	11	1.4	1.3	1.4	1.3	0.4	1.0	4.6
PB	11	3.7	3.9	5.1	4.1	0.9	3.8	12.4
LR	13	159.1	162.0	216.0	177.7	90.1	145.4	318.7
NHSO	18	214.0	275.3	637.2	355.4	107.4	277.4	938.2
OMH	17	511.4	337.7	542.5	452.5	-30.6	472.8	757.3
SOIL	18	379.3	92.8	159.5	206.8	29.0	120.9	1645.1
KNON	14	5.5	2.0	2.6	2.9	0.7	2.5	6.6

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

"OMH" IS ORGANIC MASS FROM HYDROGEN

"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.

"KNON" IS NONSOIL POTASIIUM, ESTIMATED FROM FE AND K.

"LR" IS THE COEFFICIENT OF ABSORPTION (10^{-8}m^{-1})

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

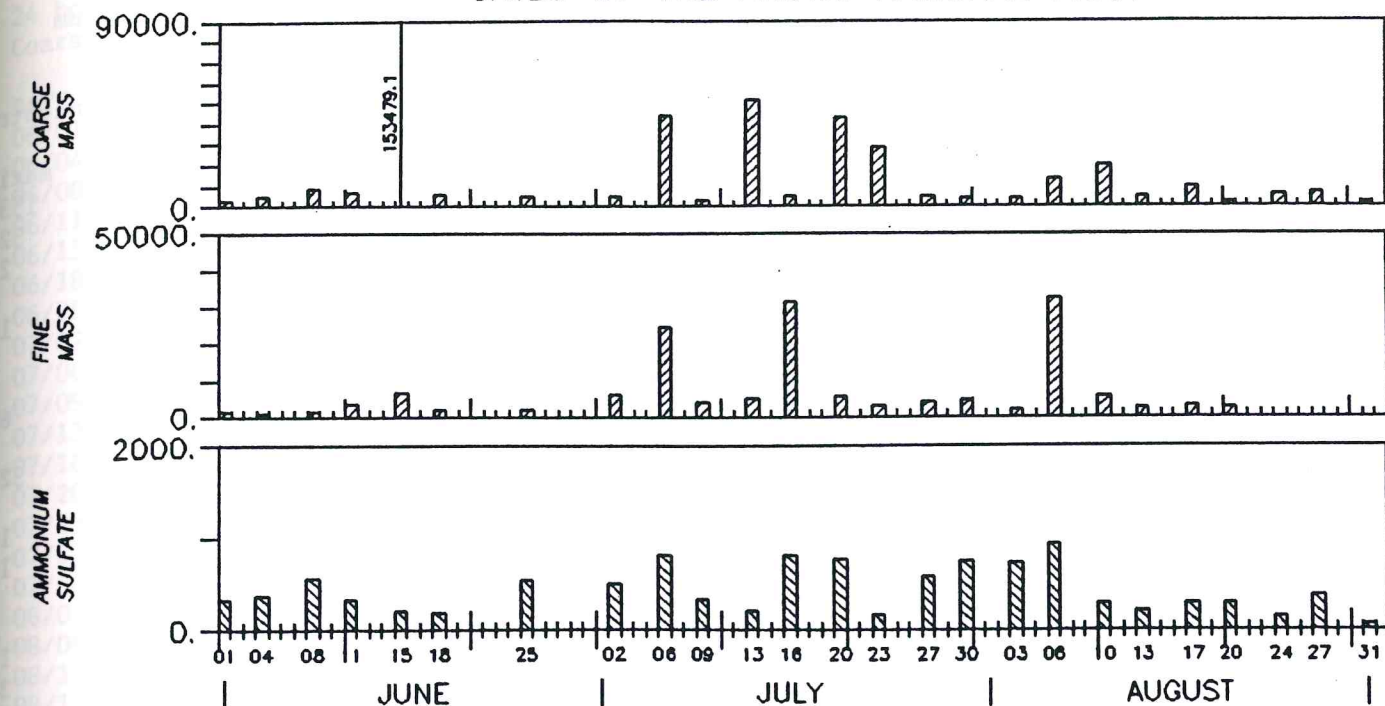
DATE	C.MASS	F.MASS	H	AL	SI	S	K	CA	TI
09/03	1198	704	60	5*	35	41	7	6	2*
09/07	2189	918	77	8	34	57	8	2*	3
09/10	3788	929	86	5*	44	69	6	5	4
09/14	3540	1735	58	4*	62	66	2*	2*	4
09/17	N/A	3286	72	107	432	53	24	37	14
09/21	2577	696*	4*	4*	4	26	6	2	2
10/08	2605	2957	44	3*	11	58	3	3	2
10/12	2778	1058	46	3*	17	84	2	2	1
10/15	2147	1145	57	3*	21	55	7	2	1*
10/19	1647	714*	41	3*	10	56	3	1*	1
10/22	4363	1502	66	20	46	89	6	7	3
10/26	971	693*	27	2*	18	37	4	2	2
10/29	1310	731*	51	2*	42	88	8	7	3
11/09	1020	1165	71	2*	36	127	5	6	2
11/12	1827	2389	109	28	73	227	15	10	4
11/16	693*	3394	99	2*	24	167	9	4	2
11/19	1217	1575	71	3*	25	113	5	6	2
11/30	1690	N/A	89	17	39	138	7	9	2

DATE	FE	NI	CU	ZN	AS	SE	BR	PB	LR
09/03	6	0.7*	4.6	5.2	0.6*	0.6*	0.8*	1.5*	126.0
09/07	4	0.7*	1.8	2.5	0.6*	0.6*	0.8*	1.5*	145.4
09/10	13	0.8*	1.4	2.7	0.6*	0.7*	2.4	1.6*	214.8
09/14	6	0.6*	1.9	2.5	0.5*	0.6*	1.9	1.3*	150.2
09/17	102	0.6*	8.9	9.2	0.5*	0.6*	1.9	8.5	N/A
09/21	1*	1.1	1.1	0.5*	0.5*	0.6*	0.7*	7.5	N/A
10/08	1	0.5*	0.7	0.4*	0.4*	0.5*	0.5*	1.1*	113.8
10/12	3	0.4*	1.0	1.7	1.2	0.4*	0.4*	0.9*	90.1
10/15	5	0.5*	2.4	2.7	0.4*	0.4*	4.6	12.4	290.3
10/19	3	0.4*	0.7	0.3*	0.3*	0.4*	0.4*	0.9*	N/A
10/22	14	0.3*	1.4	2.2	1.6	0.3*	0.4*	5.9	221.0
10/26	2	0.3*	0.6	1.8	0.3*	0.3*	0.9	2.9	N/A
10/29	10	0.4*	1.2	1.9	0.3*	0.3*	1.6	3.1	94.9
11/09	6	0.3*	4.7	4.9	0.3*	0.3*	0.8	5.2	132.1
11/12	20	0.4*	5.2	6.7	0.3*	0.4*	1.9	4.6	318.7
11/16	7	0.3*	34.5	27.1	0.3*	0.3*	1.0	5.1	292.8
11/19	5	0.4*	7.8	7.0	0.3*	0.3*	1.1	4.7	120.4
11/30	10	0.3*	0.7	1.8	0.3*	0.3*	2.0	5.8	N/A

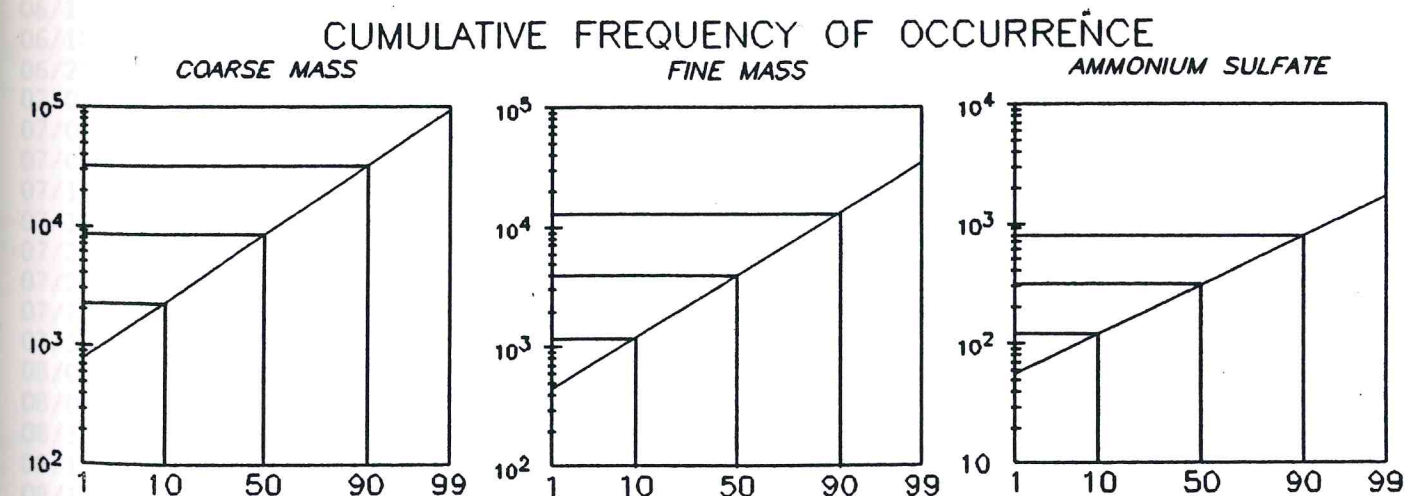
*analytical minimum detectable limit; actual concentration is less than this amount

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SUMMER 1988 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK



Each bar in the plot represents the average 24-hour concentration expressed as mass/unit volume (ng/m³). Coarse mass is the concentration of all particles with diameters between 2.5 and 15µm. Fine mass is the concentration of the particles smaller than 2.5µm. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m³.

	10%	50%	90%
COARSE MASS	2255.3	8453.3	31684.6
FINE MASS	1181.9	3905.9	12908.3
AMM. SULFATE	121.8	312.5	801.9

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

	cases found	arithmetical mean concentrations				distribution of concentrations		
		JUN	JUL	AUG	season	minimum	median	maximum
MC	25	26930	21097	7829	17954	2014	5730	153479
MF	22	2547	9933	5596	6303	695	3170	32644
H	25	104	529	367	352	40	172	2112
AL	16	81	101	15	64	2	19	442
SI	25	235	302	69	199	14	44	1340
S	25	87	130	88	103	14	81	226
K	22	19	64	25	37	1	21	168
CA	23	16.3	17.2	10.5	14.5	1.2	7.7	60.6
TI	20	9	14	4	9	1	3	51
FE	25	61.0	82.2	25.3	55.8	7.1	14.2	328.7
NI	2	INSUFFICIENT DATA				0.5	1.9	10.3
CU	16	5.1	2.6	1.8	3.0	0.5	2.9	12.8
ZN	22	4.5	5.3	2.7	4.1	INSUFFICIENT DATA		
AS	1	INSUFFICIENT DATA				INSUFFICIENT DATA		
SE	0	INSUFFICIENT DATA				0.6	2.6	16.6
BR	20	2.9	5.2	1.9	3.4	1.2	4.7	35.6
PB	19	8.4	12.2	5.3	8.7	101.9	364.4	2058.1
LR	20	285.6	545.1	654.8	487.2	58.9	334.3	933.6
NHSO	25	358.1	537.2	364.0	424.7	404.2	1557.0	22605.7
OMH	25	901.2	5457.8	3798.0	3584.4	63.4	207.2	5300.2
SOIL	25	953.3	1225.8	292.9	813.7	0.8	15.0	90.4
KNON	14	3.7	49.6	19.2	30.0			

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

"OMH" IS ORGANIC MASS FROM HYDROGEN

"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.

"KNON" IS NONSOIL POTASSIUM, ESTIMATED FROM FE AND K.

"LR" IS THE COEFFICIENT OF ABSORPTION (10^{-8} M^{-1})

SFU PARTICULATE NETWORK

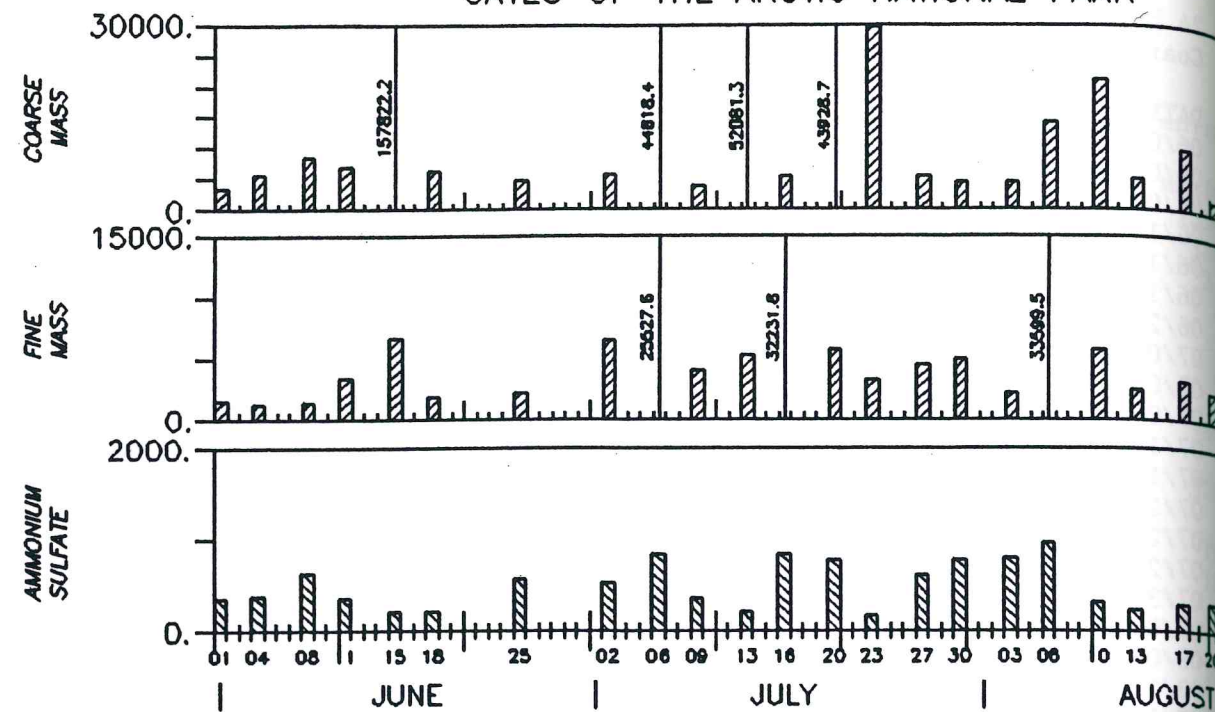
24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm.
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

DATE	C.MASS	F.MASS	H	AL	SI	S	K	CA	TI
06/01	3612	1528	74	29	59	80	14	8	1*
06/04	5548	1179	76	23	48	90	1*	8	2
06/08	8403	1365	86	3*	57	136	7	11	2
06/11	6729	3364	122	30	37	80	1*	8	2
06/15	153479	6495	172	442	1340	48	89	61	51
06/18	6078	1776	91	19	58	44	11	15	2
06/25	4663	2120	105	21	44	130	12	5	1*
07/02	5503	6279	327	32	64	117	85	13	2
07/06	43630	24851	1113	245	710	195	168	44	31
07/09	3658	3869	291	3*	39	81	34	6	3
07/13	50674	5067	170	244	750	46	53	31	33
07/16	5418	31471	2011	4*	41	195	101	2*	2*
07/20	42741	5611	187	175	561	182	45	35	24
07/23	28743	3170	61	168	490	37	37	16	22
07/27	5214	4298	282	19	28	139	22	1*	1*
07/30	4297	4782	317	15	32	180	34	6	5
08/03	4306	2153	176	14	22	175	16	5	3
08/06	13755	32644	2112	4*	137	226	100	38	9
08/10	20445	5640	339	94	312	69	39	23	11
08/13	5082	2362	88	3*	25	51	7	5	4
08/17	9933	3126	210	3*	32	67	21	5	5
08/20	2330	2330	189	10	24	70	18	6	2
08/24	5730	714*	66	2*	14	33	3	1	2
08/27	6866	695*	87	3*	43	88	14	6	3
08/31	2014	696*	40	3*	15	14	1*	5	1*

DATE	FE	NI	CU	ZN	AS	SE	BR	PB	LR
06/01	23	0.7*	0.6*	2.2	0.6*	0.7*	0.8*	4.3	166.7
06/04	14	0.7*	4.4	0.9	0.6*	0.7*	0.8*	1.7*	136.0
06/08	19	0.6*	7.3	6.2	0.6*	0.6*	1.1	2.5	171.7
06/11	14	0.6*	10.3	9.2	0.5*	0.6*	1.3	4.6	319.5
06/15	329	0.6*	8.8	10.4	0.5*	0.6*	11.9	34.7	758.0
06/18	21	0.5*	3.4	2.1	0.5*	0.5*	1.8	1.2*	226.6
06/25	9	0.6*	0.6*	0.5*	0.5*	0.6*	2.7	9.9	220.9
07/02	23	0.6*	1.9	5.5	0.6	0.6*	2.7	1.4*	840.3
07/06	172	0.7*	3.4	12.8	0.6*	0.7*	16.6	32.4	N/A
07/09	9	0.6*	0.6*	2.9	0.5*	0.6*	4.2	8.0	653.8
07/13	184	0.7*	1.5	1.2	0.6*	0.7*	8.8	35.6	409.3
07/16	17	0.8*	0.8*	8.7	0.7*	0.8*	2.1	5.0	N/A
07/20	186	0.6*	6.5	5.9	0.5*	0.5*	4.4	12.9	514.7
07/23	127	0.5*	4.6	4.3	0.5*	0.5*	2.8	8.4	170.6
07/27	10	0.6*	3.8	3.3	0.5*	0.6*	2.8	1.4*	529.1
07/30	10	0.6*	0.5*	3.3	0.5*	0.6*	2.6	4.5	698.0
08/03	13	0.6*	0.6*	0.5*	0.6*	0.6*	2.1	4.7	254.1
08/06	46	0.7*	5.1	9.7	0.6*	0.7*	3.8	4.7	2058.1
08/10	111	0.7*	1.3	3.1	0.6*	0.7*	1.5	5.5	761.4
08/13	8	5.8	0.5*	1.5	0.5*	0.6*	0.6*	1.3*	101.9
08/17	12	0.6*	1.9	2.6	0.5*	0.6*	0.6*	5.4	435.1
08/20	11	0.6*	2.3	2.7	0.5*	0.6*	0.7*	1.4*	318.0
08/24	7	0.5*	3.6	1.0	0.5*	0.5*	0.9	4.1	N/A
08/27	12	0.7*	0.7*	2.5	0.6*	0.7*	4.6	16.1	N/A
08/31	8	3.3	0.6*	0.5*	0.6*	0.6*	2.7	4.5	N/A

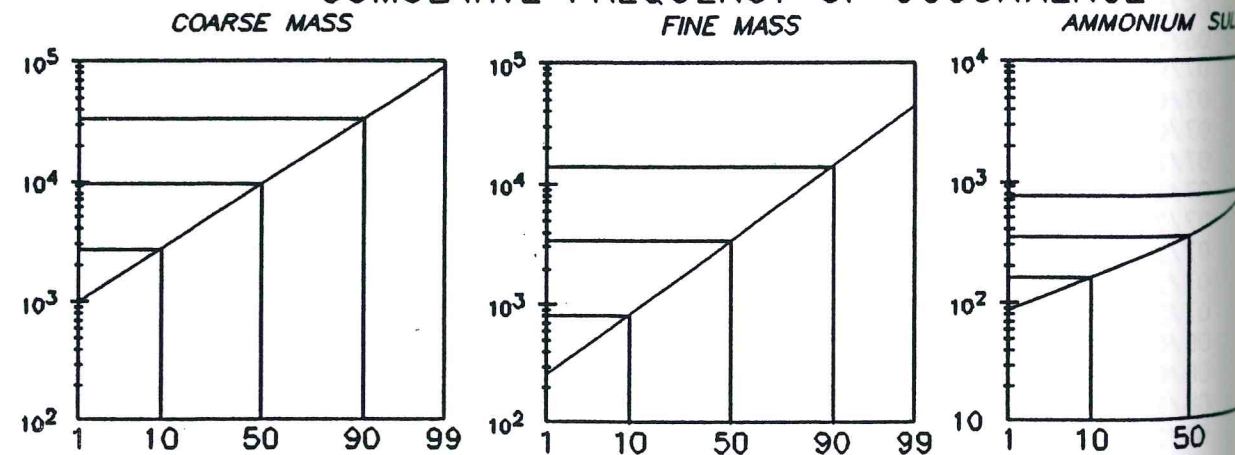
*analytical minimum detectable limit; actual concentration is less than this amount.

SUMMER 1988 PARTICULATE REPORT FOR GATES OF THE ARCTIC NATIONAL PARK



Each bar in the plot represents the average 24-hour concentration expressed as mass/unit volume (ng/m^3). Coarse mass is the concentration of all particle diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.

CUMULATIVE FREQUENCY OF OCCURRENCE



The cumulative frequency plots show the percentage of observations that exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	2742.4	9467.5	32684.5
FINE MASS	817.6	3374.9	13931.6
AMM. SULFATE	159.8	345.7	747.9

GATES OF THE ARCTIC NATIONAL PARK

JUN 1988 - AUG 1988

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$. Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

DATE	C.MASS	F.MASS	AL	SI	S	K	CA	TI
06/01	3712	1571	27	64	85	15	11	8.0
06/04	5708	1213	4*	47	91	2*	10	4.4
06/08	8627	1401	4*	55	148	10	9	3.2
06/11	6916	3458	29	40	84	22	4	3.2
06/15	157822	6678	444	1377	49	90	63	50.7
06/18	6256	1828	22	61	47	12	18	4.0
06/25	4795	2179	18	45	134	11	7	1.3*
07/02	5659	6457	34	67	123	84	16	7.7
07/06	44818	25528	246	726	200	169	45	29.4
07/09	3762	3979	3*	40	85	35	8	5.5
07/13	52081	5208	251	769	47	53	33	34.7
07/16	5549	32232	5*	29	200	101	2*	2.0*
07/20	43929	5767	177	577	186	44	35	24.0
07/23	29557	3260	174	504	37	38	18	20.7
07/27	5356	4415	18	28	145	26	1*	3.0
07/30	4421	4920	17	30	185	34	7	6.6
08/03	4421	2211	26	30	192	17	5	4.7
08/06	14158	33600	5*	140	230	103	31	9.2
08/10	21002	5794	99	323	72	40	27	18.4
08/13	5224	2428	3*	20	51	7	5	7.2
08/17	10209	3213	3*	37	70	19	8	3.3
08/20	2396	2396	3*	23	75	19	7	6.6
08/24	5883	600*	3*	27	33	11	1*	5.9
08/27	7064	600*	4*	45	90	14	1*	3.0

DATE	FE	NI	CU	ZN	AS	SE	BR	PB
06/01	24	0.7*	0.6*	2.3	0.6*	0.7*	0.8*	5.5
06/04	15	0.7*	4.6	0.9	0.7*	0.7*	0.8*	1.8*
06/08	18	0.6*	7.6	6.4	0.6*	0.6*	1.3	2.8
06/11	15	0.6*	10.7	9.4	0.5*	0.6*	1.7	5.0
06/15	338	0.6*	9.3	10.8	0.5*	0.6*	12.3	35.6
06/18	21	0.5*	3.7	2.2	0.5*	0.5*	2.0	3.3
06/25	9	0.6*	0.6*	0.5*	0.5*	0.6*	2.9	10.2
07/02	23	0.6*	0.6*	6.0	0.6	0.6*	2.5	1.4*
07/06	199	0.7*	0.7*	12.4	0.7*	0.7*	17.0	33.5
07/09	10	0.6*	0.6*	2.9	0.5*	0.6*	4.4	8.7
07/13	190	0.7*	1.6	1.2	0.7*	0.7*	9.3	37.0
07/16	38	0.8*	0.8*	9.0	0.7*	0.8*	2.3	5.2
07/20	192	0.6*	6.7	6.0	0.5*	0.5*	4.6	13.3
07/23	131	0.5*	4.9	4.4	0.5*	0.5*	3.2	9.3
07/27	11	0.6*	4.1	3.4	0.7	0.6*	2.7	1.5*
07/30	11	0.6*	0.6*	3.5	0.5*	0.6*	2.8	5.8
08/03	13	0.6*	0.6*	0.5*	0.6*	0.6*	2.2	5.0
08/06	48	0.7*	5.3	10.1	0.6*	0.7*	3.9	5.1
08/10	114	0.7*	1.4	3.1	0.6*	0.7*	1.7	6.3
08/13	9	7.1	0.5*	1.7	0.5*	0.6*	0.6*	1.4*
08/17	12	0.6*	2.1	2.6	0.5*	0.6*	0.7*	5.7
08/20	12	0.6*	0.6*	3.3	0.5*	0.6*	0.7*	5.6
08/24	7	0.5*	3.7	1.0	0.5*	0.5*	0.9	4.2
08/27	13	0.7*	0.7*	2.5	0.6*	0.7*	5.1	15.6

*analytical minimum detectable limit; actual concentration is less than this amount.

SFU PARTICULATE NETWORK

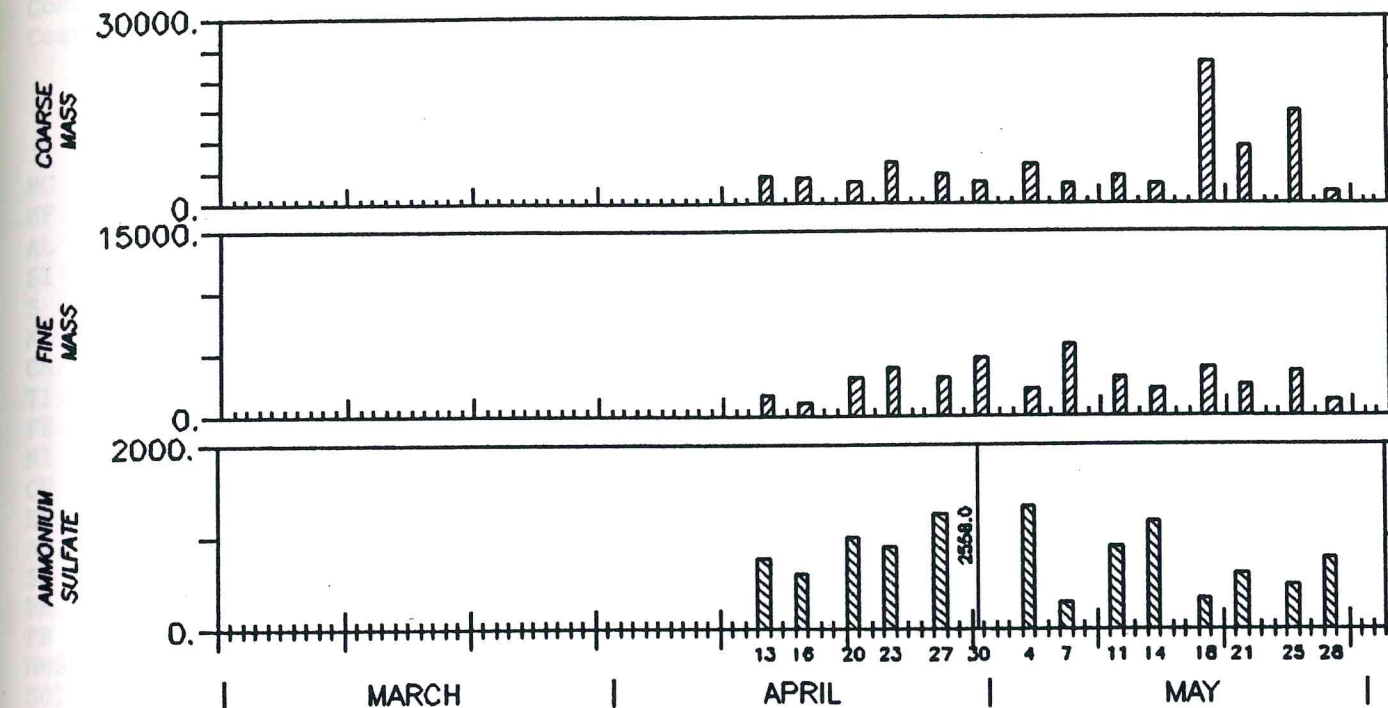
Concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$
Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

	cases found	arithmetic mean concentrations				distribution of concentrations		
		JUN	JUL	AUG	season	minimum	median	maximum
MC	24	27691	21681	8795	19138	2396	6069	15782
MF	22	2618	10196	6355	6706	600	3359	3360
AL	14	78	103	18	67	3	18	44
SI	24	241	308	81	213	20	46	137
S	24	91	134	102	111	33	88	230
K	23	23	65	29	41	2	24	140
CA	20	17	18	11	16	1	9	60
TI	22	10.7	14.8	7.3	11.1	1.3	6.2	50.0
FE	24	63	89	29	61	7	16	330
NI	1				INSUFFICIENT DATA			
CU	13	5.3	2.3	1.9	3.0	0.5	1.5	10.0
ZN	22	4.7	5.4	3.1	4.4	0.5	3.2	12.0
AS	2				INSUFFICIENT DATA			
SE	0				INSUFFICIENT DATA			
BR	19	3.1	5.4	2.0	3.6	0.6	2.4	17.0
PB	20	9.2	12.9	6.1	9.5	1.4	5.5	37.0
NHSO	24	375.6	554.5	419.6	457.4	136.7	361.1	947.0
SOIL	24	975.9	1273.1	332.8	873.0	88.7	190.3	5467.0
KNON	24	2.3	27.1	13.7	15.4	1.1	5.2	74.0

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

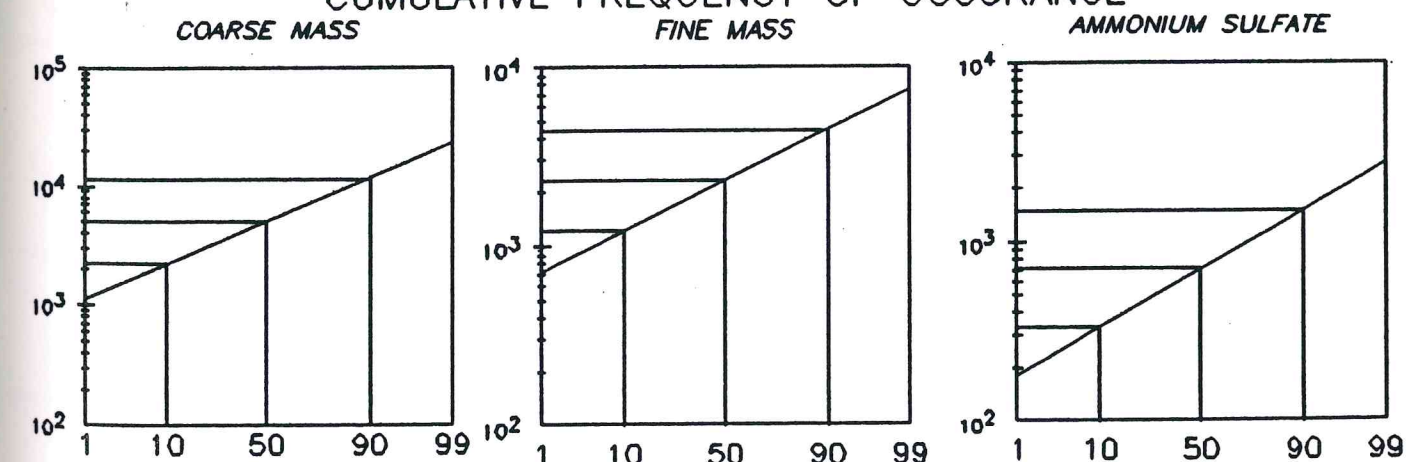
"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.

"KNON" IS NONSOIL POTASSIUM, ESTIMATED FROM FE AND K.

SPRING 1988 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK

Each bar in the plot represents the average 24-hour concentration expressed as mass/unit volume (ng/m^3). Coarse mass is the concentration of all particles with diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.

CUMULATIVE FREQUENCY OF OCCURANCE



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	2216.2	5060.2	11553.9
FINE MASS	1209.5	2313.9	4426.9
AMM. SULFATE	330.8	701.8	1488.9

24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

DATE	C.MASS	F.MASS	AL	SI	S	K	CA	TI
4/13	4425	1729	40	68	186	13	18	1.0*
4/16	4233	1077	54	91	145	14	16	1.5
4/20	3544	3067	28	66	240	14	16	1.9
4/23	6856	3875	34	80	217	11	25	1.4*
4/27	4697	3015	85	159	302	27	23	2.4
4/30	3433	4627	58	130	620	22	25	2.1
5/ 4	6507	2144	78	146	320	22	27	3.3
5/ 7	3325	5783	13	22	69	7	10	1.4
5/11	4423	3139	54	111	217	19	32	1.6
5/14	3207	2088	57	89	281	18	19	1.2*
5/18	22535	3791	109	327	78	20	20	4.7
5/21	9153	2456	43	110	145	14	13	2.1
5/25	14886	3531	3*	148	113	13	12	3.2
5/28	2018	1196	3*	65	184	16	19	2.5

DATE	FE	NI	CU	ZN	AS	SE	BR	PB
4/13	20	0.3*	0.3*	0.7	0.3*	0.3*	1.9	1.5
4/16	26	0.4*	0.3*	0.3*	0.3*	0.3*	0.8	1.0
4/20	18	0.4*	0.3*	1.2	0.3*	0.3	0.8	1.0*
4/23	20	0.5*	0.4*	1.4	0.4*	0.4*	1.4	1.2*
4/27	38	0.4*	0.3*	1.0	0.3*	0.3*	1.1	0.9*
4/30	30	0.4*	0.5	1.2	0.3*	0.3*	3.7	1.2
5/ 4	38	0.5*	0.4*	0.9	0.4*	0.4*	1.7	2.7
5/ 7	8	0.7	0.3*	2.2	0.3*	0.4*	0.5*	2.0
5/11	27	0.4*	0.4	0.8	0.3*	0.3*	1.1	1.3
5/14	19	0.6	0.3*	1.0	0.3*	0.4*	2.3	1.5
5/18	86	0.3*	0.3*	0.6	0.3*	0.4	0.4*	0.8*
5/21	29	0.4*	0.4*	0.3*	0.4*	0.4*	2.0	1.2
5/25	51	0.5*	0.4*	0.4*	0.4*	0.4*	1.4	1.6
5/28	22	0.5*	0.4*	0.4*	0.5*	0.5	1.8	1.4*

*analytical minimum detectable limit; actual concentration is less than this

Concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

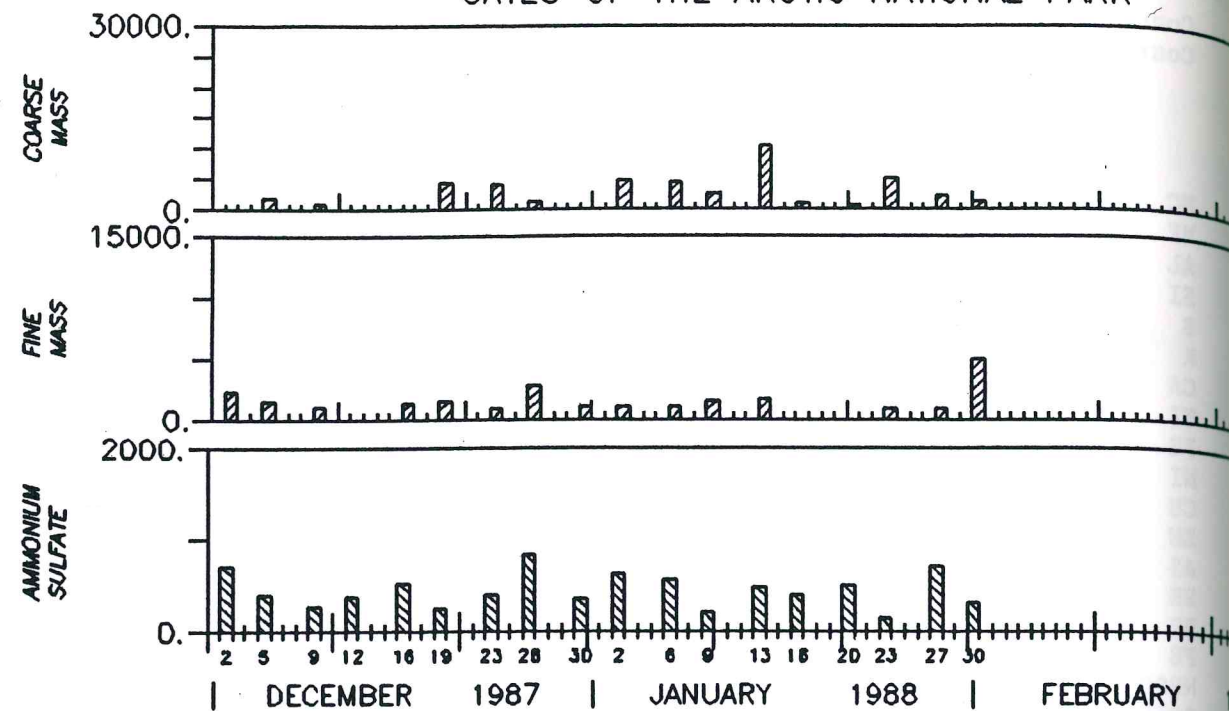
	cases found	arithmetric mean concentrations				distribution of concentrations		
		MAR	APR	MAY	season	minimun	median	maximum
MC	14	0	4531	8257	6660	2018	4424	22535
MF	14	0	2898	3016	2966	1077	3041	5783
AL	12	0	50	45	47	3	49	109
SI	14	0	99	127	115	22	101	327
S	14	0	285	176	223	69	201	620
K	14	0	17	16	16	7	15	27
CA	14	0	20	19	20	10	19	32
TI	11	0.0	1.7	2.5	2.2	1.0	2.0	4.7
FE	14	0	26	35	31	8	27	86
NI	2				INSUFFICIENT DATA			
CU	2				INSUFFICIENT DATA			
ZN	10	0.0	1.0	0.8	0.9	0.3	0.9	2.2
AS	0				INSUFFICIENT DATA			
SE	3				INSUFFICIENT DATA			
BR	12	0.0	1.6	1.4	1.5	0.4	1.4	3.7
PB	9	0.0	1.1	1.6	1.4	0.8	1.3	2.7
NHSO	14	0.0	1175.7	724.8	918.0	284.6	830.4	2558.0
SOIL	14	0.0	456.8	538.1	503.3	122.0	455.8	1318.1
KNON	14	0.0	0.4	0.9	0.7	0.1	0.0	5.0

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

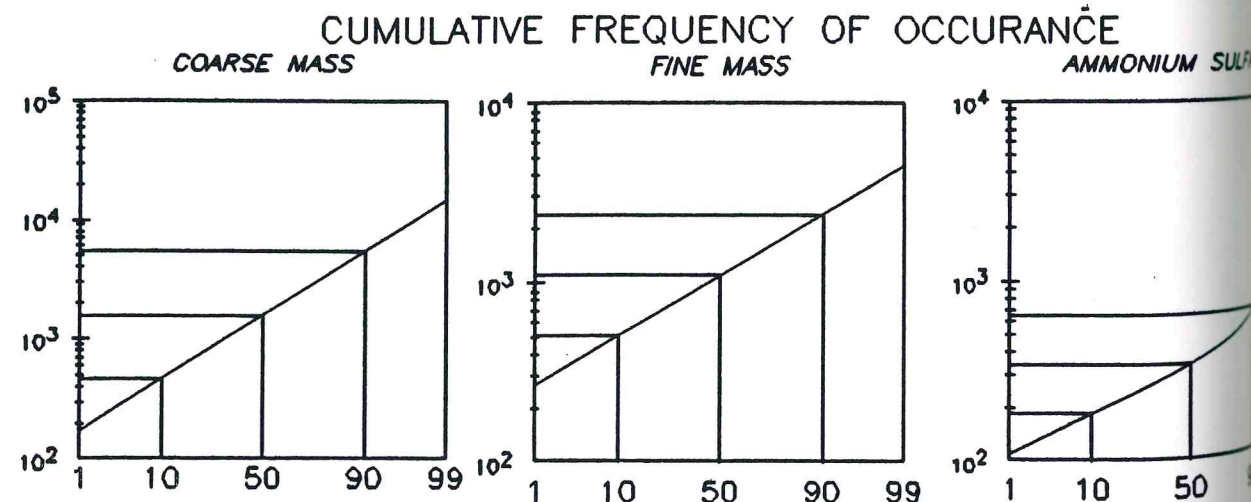
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"KNON" IS NONSOIL POTASium, ESTIMATED FROM FE AND K.

WINTER 1987 PARTICULATE REPORT FOR GATES OF THE ARCTIC NATIONAL PARK



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The cumulative frequency plots show the percentage of observations that exceeded a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	464.6	1586.2	5415.9
FINE MASS	506.3	1099.3	2386.9
AMM. SULFATE	182.3	340.9	637.6

GATES OF THE ARCTIC NATIONAL PARK

DEC 1987 - FEB 1988

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$. Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

DATE	C.MASS	F.MASS	AL	SI	S	K	CA	TI
12/ 2	600*	2348	4*	18	171	30	23	1.5*
12/ 5	1936	1564	7	12	95	15	12	1.3*
12/ 9	1138	1066	3*	12	66	8	6	1.4
12/12	600*	600*	4*	16	87	14	11	1.6*
12/16	600*	1416	13	20	126	8	6	1.2
12/19	4640	1522	3*	17	58	8	6	2.8
12/23	4329	821	4*	20	96	13	12	1.4*
12/26	1540	2786	5*	18	201	37	38	1.5*
12/30	600*	1010	14	29	86	5	5	1.3*
1/ 2	4706	1069	4*	67	150	23	19	1.9
1/ 6	4575	1072	21	57	133	23	12	1.4*
1/ 9	2572	1572	4*	40	46	15	9	1.7
1/13	10455	1662	31	66	114	14	18	2.6
1/16	1213	600*	17	27	95	14	9	1.4*
1/20	902	600*	3*	22	117	8	4	1.6
1/23	5033	959	4*	28	31	7	6	1.6*
1/27	2318	966	3*	20	169	11	5	1.6
1/30	1338	4905	19	24	73	6	1*	0.9

DATE	FE	NI	CU	ZN	AS	SE	BR	PB
12/ 2	7	0.8	1.4	1.9	0.4*	0.4*	1.9	1.3*
12/ 5	3	0.5*	0.4*	0.7	0.4*	0.4*	1.0	1.2*
12/ 9	3	0.5*	0.4*	0.8	0.4*	0.4*	0.5*	1.2*
12/12	3	0.6	0.5*	0.5*	0.5*	0.5*	2.6	1.5*
12/16	5	0.4*	0.3*	0.4	0.3*	0.3*	0.4*	1.3
12/19	5	0.5*	0.4*	0.4*	0.4*	0.4*	0.5	1.7
12/23	5	0.7	2.4	3.1	0.4*	0.4*	1.1	1.6
12/26	4	0.7	4.3	3.4	0.4*	0.4*	2.0	1.3*
12/30	5	0.7	0.5	0.4	0.4*	0.4*	1.9	7.3
1/ 2	14	0.5*	0.4*	0.8	0.4*	0.4	0.8	1.3*
1/ 6	12	0.5*	1.5	2.8	0.4*	0.4*	0.5*	4.2
1/ 9	7	0.5*	5.6	4.4	0.4*	0.4*	1.5	8.7
1/13	17	0.5*	0.5	1.0	0.4*	0.4*	0.5*	1.2
1/16	6	0.5*	0.5	0.6	0.4*	0.4*	1.4	3.3
1/20	4	0.5	0.4*	0.4*	0.4*	0.4*	0.5*	1.7
1/23	7	1.4	0.5*	0.5*	0.5*	0.5*	0.7*	1.8
1/27	3	0.4*	0.3*	1.1	0.3*	0.4*	0.5*	1.6
1/30	5	0.9	0.4*	0.3*	0.4*	0.4*	0.6	1.1*

*analytical minimum detectable limit; actual concentration is less than this amount.

SFU PARTICULATE NETWORK

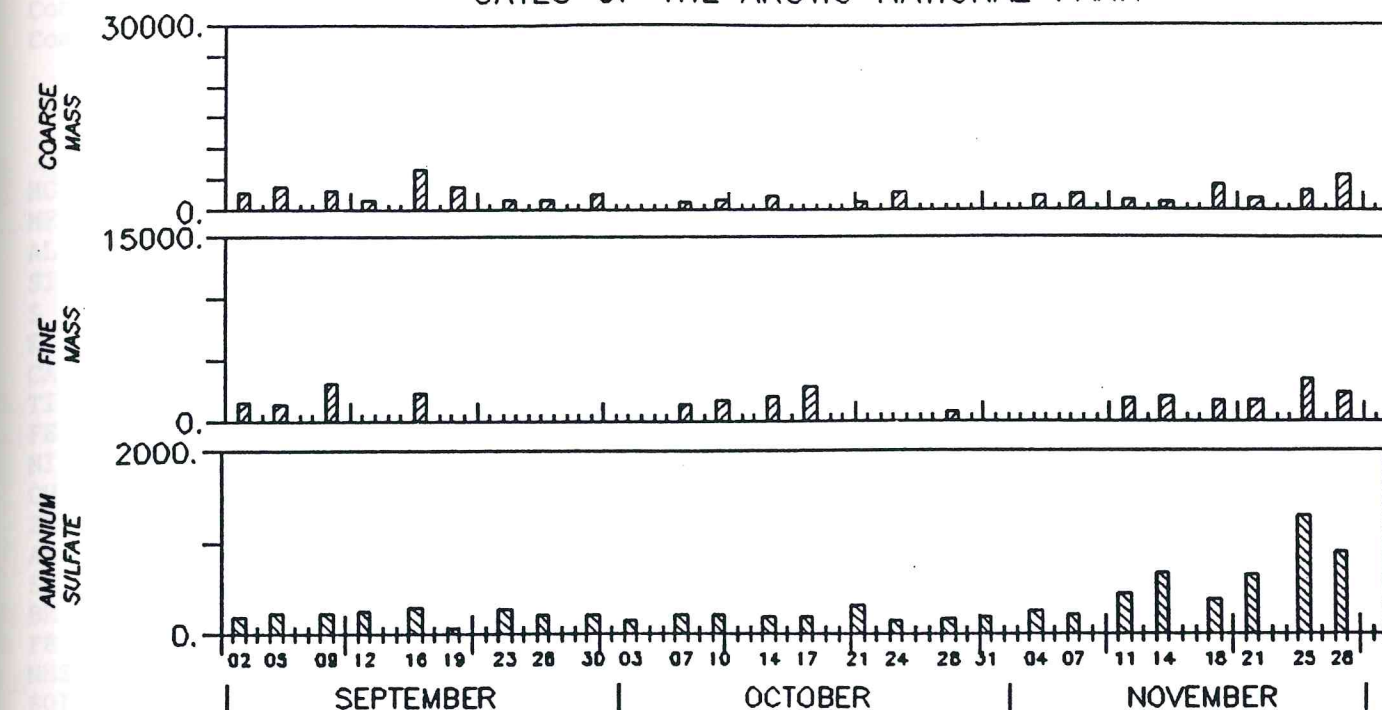
Concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$
Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

	cases found	arithmetic mean concentrations				distribution of concentrations		
		DEC	JAN	FEB	season	minimum	median	maximum
MC	14	1776	3679	0	2727	600	1738	10450
MF	15	1459	1489	0	1474	600	1071	4900
AL	7	6	12	0	9	3	4	30
SI	18	18	39	0	29	12	21	60
S	18	109	103	0	106	31	96	200
K	18	15	14	0	14	5	13	30
CA	17	13	9	0	11	1	9	30
TI	9	1.6	1.6	0.0	1.6	0.9	1.5	2.0
FE	18	5	8	0	6	3	5	10
NI	8	0.6	0.6	0.0	0.6	0.4	0.5	1.0
CU	8	1.2	1.1	0.0	1.2	0.3	0.5	5.0
ZN	13	1.3	1.3	0.0	1.3	0.3	0.7	4.0
AS	0	INSUFFICIENT DATA						
SE	1	INSUFFICIENT DATA						
BR	11	1.3	0.8	0.0	1.1	0.4	0.8	2.0
PB	11	2.0	2.8	0.0	2.4	1.1	1.6	8.0
NHSO	18	451.4	425.3	0.0	438.4	129.0	394.6	827.0
SOIL	18	80.1	151.7	0.0	115.9	41.8	95.7	310.0
KNON	18	12.1	7.9	0.0	10.0	1.6	9.3	33.0

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

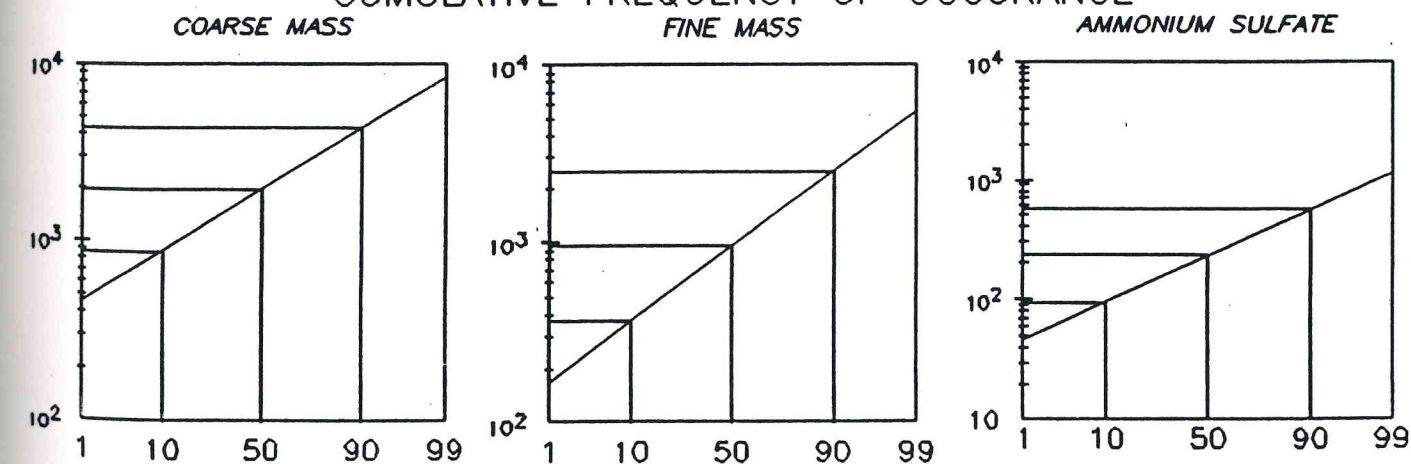
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FALL 1987 PARTICULATE REPORT FOR
GATES OF THE ARCTIC NATIONAL PARK

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CUMULATIVE FREQUENCY OF OCCURANCE



The cumulative frequency plots show the percentage of observations that did not exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	873.1	1952.5	4366.0
FINE MASS	363.6	951.5	2489.7
AMM. SULFATE	94.6	230.1	559.4

GATES OF THE ARCTIC NATIONAL PARK

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

DATE	C.MASS	F.MASS	AL	SI	S	K	CA	TI
09/02	2924	1569	15	2*	42	5	2	3.7
09/05	4041	1347	3	1*	51	5	1	0.6*
09/09	3249	3028	7	1*	55	3	1*	0.6*
09/12	1646	600*	3	2*	60	1*	1*	1.6
09/16	6637	2286	30	32	70	5	6	1.4
09/19	3894	600*	9	7	10	2	2	1.6
09/23	1610	600*	12	2*	62	3	5	0.8*
09/26	1740	600*	13	7	48	2	1*	1.9
09/30	2694	600*	8	2	49	3	7	1.8
10/03	600*	600*	6	12	32	2	2	0.8*
10/07	1239	1385	6	12	46	2	4	1.1
10/10	1862	1713	12	21	48	3	3	0.8*
10/14	2432	1932	12	27	42	4	7	0.8
10/17	600*	2841	4	11	41	5	4	0.7*
10/21	1528	600*	5	13	76	3	4	0.5
10/24	2837	600*	13	2*	36	4	5	1.6
10/28	N/A	809	2*	10	39	3	2	0.8
10/31	N/A	600*	8	14	44	5	2	0.7*
11/04	2206	600*	10	2	56	4	4	0.6
11/07	2530	600*	11	2*	47	4	6	1.7
11/11	1736	1880	5	4	102	4	5	0.8
11/14	1349	2024	8	7	162	9	7	0.9
11/18	4195	1706	25	18	89	10	9	1.4*
11/21	2126	1613	20	20	156	10	12	0.7
11/25	3165	3453	20	26	311	15	6	1.0
11/28	5649	2348	20	24	214	14	12	0.7*

DATE	FE	NI	CU	ZN	AS	SE	BR	PB
09/02	3	0.3	0.7	1.0	0.3*	0.3*	1.4	6.6
09/05	0	0.2*	0.4	0.2*	0.2*	0.2*	0.3*	0.6*
09/09	0	0.2	0.3	0.2*	0.2*	0.2*	0.3*	1.4
09/12	1	0.3*	0.9	0.2*	0.2*	0.3*	0.3*	1.2
09/16	12	0.3*	3.2	1.3	0.2*	0.2*	0.3*	1.4
09/19	4	0.4*	3.1	2.0	0.3*	0.3*	0.4*	0.9*
09/23	6	0.3*	1.3	0.3*	0.3*	0.3*	0.4*	6.9
09/26	4	0.3*	5.3	2.3	0.2*	0.3*	0.3*	1.7
09/30	6	0.3	0.2*	0.2*	0.2*	0.3*	0.3*	1.4
10/03	3	0.3	0.3	0.5	0.2	0.3*	0.3*	0.8*
10/07	4	0.3*	1.2	0.8	0.2*	0.3*	0.3*	0.8
10/10	8	0.3*	0.8	0.5	0.2*	0.3*	0.3*	1.2
10/14	10	0.2*	1.3	1.3	0.1	0.2*	0.3*	0.6*
10/17	2	0.1	2.8	1.8	0.2*	0.2*	0.5	0.7*
10/21	5	0.3	0.5	0.2*	0.1*	0.1	0.3	0.6*
10/24	6	0.3	0.7	0.3*	0.3*	0.3*	0.4*	2.0
10/28	2	0.3*	0.4	0.3*	0.2*	0.3*	0.3*	0.8*
10/31	2	0.3	0.3	0.3*	0.2*	0.2*	0.3*	1.1
11/04	5	0.2	0.4	0.1	0.2*	0.2*	3.3	3.5
11/07	4	0.4	1.1	0.3*	0.3*	0.3*	0.4*	1.1
11/11	4	0.4	1.3	0.2*	0.2*	0.3*	0.3*	1.2
11/14	6	0.3*	0.3*	0.3*	0.3*	0.3*	0.3*	1.4
11/18	10	0.7*	2.0	1.5	1.4	0.6*	1.6	6.8
11/21	15	0.3*	0.4	0.3	0.2*	0.3*	0.3*	1.9
11/25	17	0.3	8.9	10.5	0.2*	0.3*	0.5	7.7
11/28	14	0.3*	14.8	12.5	0.3*	0.2	0.8	1.9

*analytical minimum detectable limit; actual concentration is less than this

GATES OF THE ARCTIC NATIONAL PARK

SEP - NOV 1987

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than 2.5µm
Coarse mass is for particles larger than 2.5µm and smaller than 15µm.

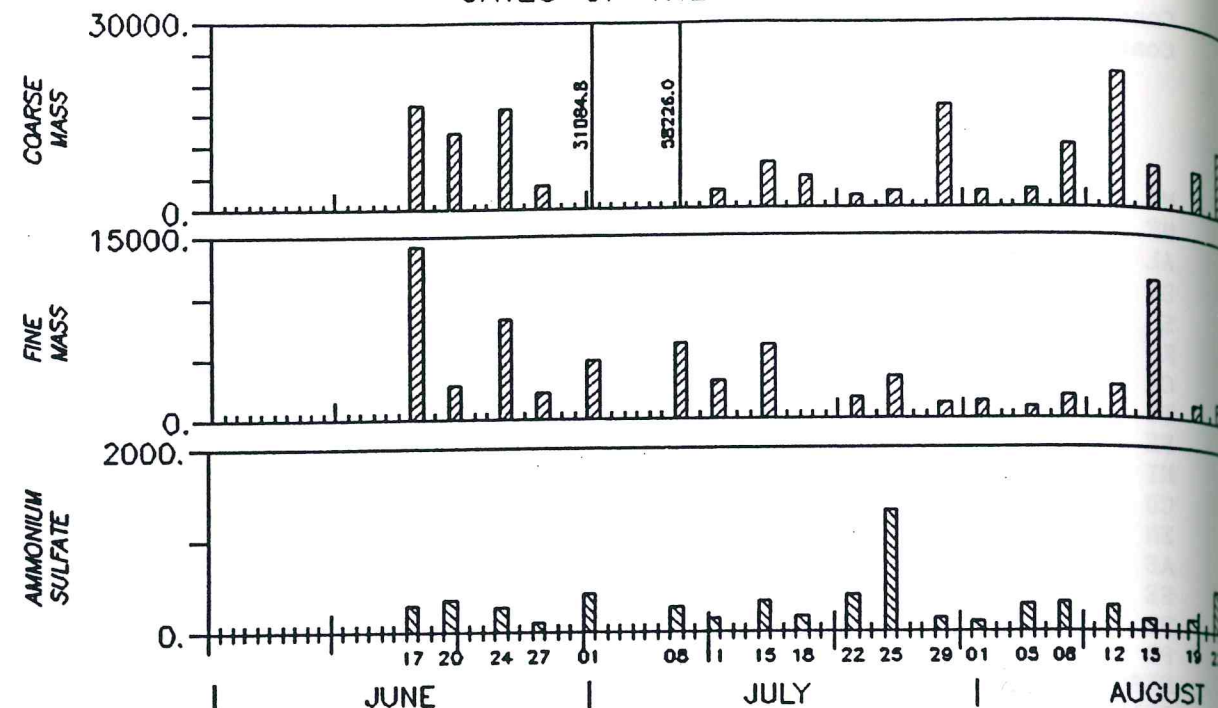
	cases found	arithmetic mean concentrations				distribution of concentrations		
		SEP	OCT	NOV	season	minimum	median	maximum
MC	22	3160	1585	2869	2604	600	1994	6637
MF	15	1248	1231	1778	1405	600	1366	3453
AL	25	11	7	15	11	2	10	30
SI	19	6	14	13	11	1	9	32
S	26	50	45	142	76	10	50	311
K	25	3	3	9	5	1	4	15
CA	23	3	4	8	5	1	4	12
TI	17	1.5	0.9	1.0	1.1	0.5	0.8	3.7
FE	26	4	5	9	6	0	4	17
NI	12	0.3	0.3	0.4	0.3	0.1	0.3	0.7
CU	24	1.7	0.9	3.6	2.0	0.2	0.9	14.8
ZN	14	0.9	0.7	3.2	1.5	0.1	0.3	12.5
AS	3	INSUFFICIENT DATA						
SE	2	INSUFFICIENT DATA						
BR	7	0.4	0.3	0.9	0.6	0.3	0.3	3.3
PB	19	2.4	1.0	3.2	2.2	0.6	1.3	7.7
NHSO	26	205.3	184.9	585.7	315.3	43.1	206.4	1281.5
SOIL	26	52.8	66.3	101.7	72.5	5.9	54.7	190.9
KNON	26	1.1	0.9	2.1	1.3	0.5	0.2	4.9

"NHSO" IS AMMONIUM SULFATE, CALCULATED AS 4.125 TIMES S.

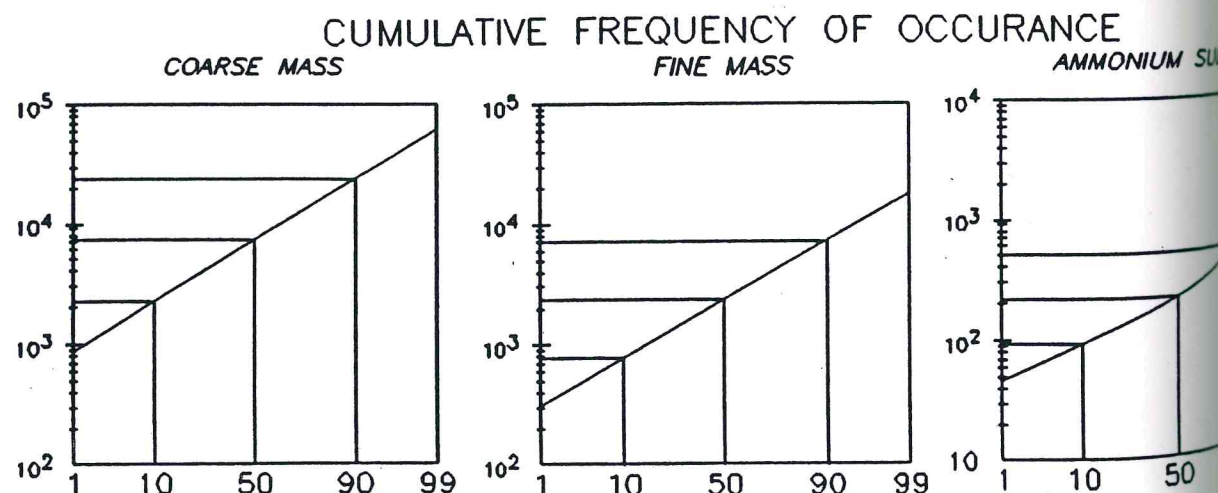
"SOIL" IS THE SUM OF AL, SI, CA, TI, AND FE, ESTIMATED OXIDES AND MINOR COMPONENTS.

"KNON" IS NONSOIL POTASIIUM, ESTIMATED FROM FE AND K.

SUMMER 1987 PARTICULATE REPORT FOR GATES OF THE ARCTIC NATIONAL PARK



Each bar in the plot represents the average 24-hour concentration expressed in mass/unit volume (ng/m^3). Coarse mass is the concentration of all particle diameters between 2.5 and $15\mu\text{m}$. Fine mass is the concentration of the particles smaller than $2.5\mu\text{m}$. Am. sulfate is the major manmade component of fine mass. Most visibility reduction is due to the scattering of light from these fine particles.



The cumulative frequency plots show the percentage of observations that exceed a certain concentration. X % of the time concentrations were less than Y ng/m^3 .

	10%	50%	90%
COARSE MASS	2287.8	7393.6	23894.6
FINE MASS	772.3	2346.3	7128.0
AMM. SULFATE	92.6	216.1	504.2

GATES OF THE ARCTIC NATIONAL PARK

JUN - AUG 1987

SFU PARTICULATE NETWORK

24 hour concentrations in nanograms/cubic meter for particles smaller than $2.5\mu\text{m}$. Coarse mass is for particles larger than $2.5\mu\text{m}$ and smaller than $15\mu\text{m}$.

DATE	C.MASS	F.MASS	AL	SI	S	K	CA	TI
06/17	16661	14125	38	98	68	14	9	2.6
06/20	12394	2843	41	99	84	11	11	2.5
06/24	16065	8317	95	188	62	68	32	4.7
06/27	3742	2138	2*	12	25	6	3	1.0
07/01	31085	4761	70	212	98	25	12	7.5
07/08	58226	6233	277	743	62	69	38	24.4
07/11	3106	3106	2*	5	33	4	1	0.8*
07/15	7430	6060	36	92	78	25	11	3.3
07/18	5098	600*	20	17	36	4	5	1.4
07/22	2104	1741	5	1*	96	8	2	0.5
07/25	2663	3383	7	7	315	4	4	0.6*
07/29	16406	1234	137	242	34	16	21	4.9
08/01	2541	1345	8	1*	25	7	2	2.4
08/05	2898	942	5	2*	70	8	3	3.3
08/08	10013	1841	22	2	72	10	4	1.5
08/12	21674	2682	2*	178	62	14	21	4.4
08/15	6921	11411	4	1*	29	7	1*	1.0
08/19	6805	1158	16	16	29	8	3	0.7*
08/22	10667	1692	8	1*	107	6	1	1.2
08/26	11526	1015	2*	89	39	8	6	3.2
08/29	8409	1015	17	28	79	3	6	1.5

DATE	FE	NI	CU	ZN	AS	SE	BR	PB
06/17	25	0.4*	9.4	9.7	0.2*	0.4*	1.1	4.1
06/20	21	0.5*	0.5*	0.5*	0.3*	0.5*	1.8	6.5
06/24	54	0.4*	1.8	3.8	0.2*	0.3*	0.8	1.9
06/27	3	0.4*	3.4	3.1	0.2*	0.3*	0.4*	0.9*
07/01	54	0.3*	0.3*	0.9	0.2*	0.3*	0.8	0.9
07/08	219	0.4*	11.5	10.3	0.2*	0.4*	1.4	2.1
07/11	1	0.3*	3.8	3.7	0.2*	0.3*	0.4*	1.1
07/15	31	0.4*	0.5	1.3	0.2*	0.3*	2.4	8.6
07/18	7	0.3*	0.2*	0.2*	0.2*	0.2*	0.3*	1.2
07/22	1	0.1	1.2	0.7	0.2*	0.2*	0.3*	0.6
07/25	3	0.2*	4.7	2.2	0.2*	0.2*	0.4	0.9
07/29	77	0.3*	0.5	0.3	0.2*	0.3*	0.3*	0.8
08/01	2	0.4	0.5	0.2*	0.5	0.3*	0.3*	2.0
08/05	1	0.3	0.5	0.3	0.3	0.3*	0.3*	1.4
08/08	5	0.5	1.0	0.1	0.3*	0.3*	0.3*	0.8
08/12	60	0.3*	0.3*	0.2	0.3*	0.3*	0.3*	0.9
08/15	0	0.3*	1.3	0.8	0.3	0.2*	0.3*	1.2
08/19	8	0.5	0.3*	0.3*	0.2*	0.3*	0.2	1.6
08/22	4	0.3	0.4	0.2*	0.2*	0.2*	0.3*	1.4
08/26	29	0.2*	2.1	0.7	0.2*	0.2*	0.3*	0.7
08/29	9	0.3*	24.4	17.3	0.2*	0.3*	0.3*	2.8

*analytical minimum detectable limit; actual concentration is less than this amount.

SFU PARTICULATE NETWORK

Concentrations in nanograms/cubic meter for particles smaller than 2.5 μ m
Coarse mass is for particles larger than 2.5 μ m and smaller than 15 μ m.

		arithmetic mean concentrations				distribution of concentrations		
	cases found	JUN	JUL	AUG	season	minimum	median	maximum
MC	21	12216	15765	9050	12211	2104	8409	5822
MF	20	6856	3390	2567	3697	600	2138	1412
AL	17	44	69	9	39	2	16	27
SI	16	99	165	35	97	1	17	74
S	21	60	94	57	72	25	62	31
K	21	24	19	8	15	3	8	8
CA	20	14	12	5	9	1	5	2
TI	18	2.7	5.4	2.1	3.5	0.5	2.4	24
FE	21	26	49	13	29	0	8	21
NI	6	0.4	0.3	0.4	0.3	0.1	0.3	0.3
CU	16	3.8	2.8	3.4	3.3	0.2	1.0	24
ZN	16	4.3	2.4	2.2	2.7	0.1	0.7	17
AS	3			INSUFFICIENT DATA				
SE	0			INSUFFICIENT DATA				
BR	8	1.0	0.8	0.3	0.6	0.2	0.3	2
PB	20	3.4	2.0	1.4	2.0	0.6	1.2	8
NHSO	21	246.7	388.7	234.5	295.6	101.9	257.2	1299
SOIL	21	435.4	715.0	149.6	419.4	6.9	112.7	3128
KNON	21	8.4	1.9	3.5	3.8	2.3	2.5	29

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