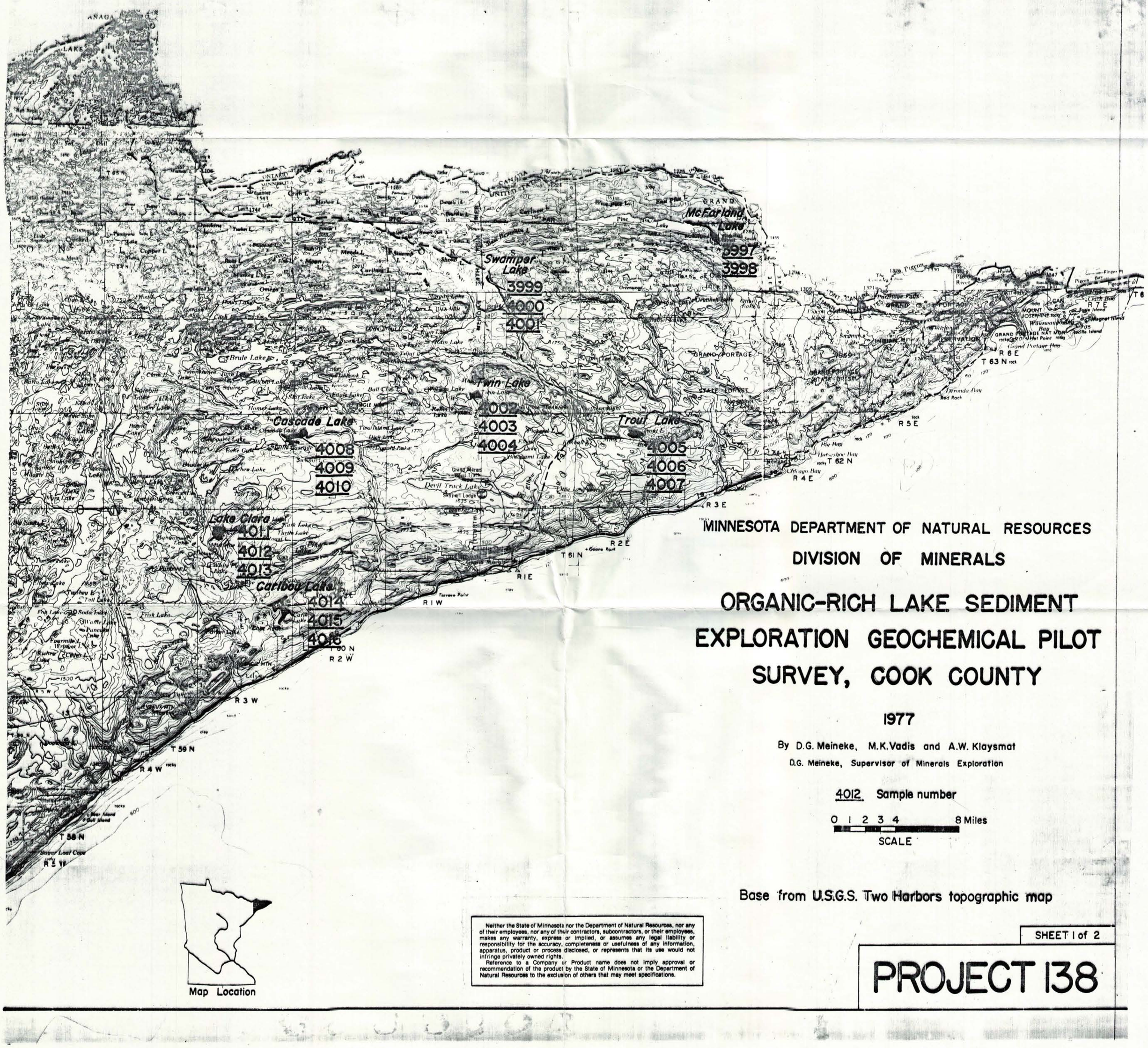

Map Location

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINERALS

ORGANIC-RICH LAKE SEDIMENT EXPLORATION GEOCHEMICAL PILOT SURVEY, COOK COUNTY

1977

By D.G. Meineke, M.K.Vadis and A.W. Klaysmat

D.G. Meineke, Supervisor of Minerals Exploration

4012 Sample number

0 1 2 3 4 8 Miles

SCALE

Base from U.S.G.S. Two Harbors topographic map

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Sample Number	Lake Name	Rock Type	Sample Depth (feet)	As (ppm)	Co (ppm)	Cu (ppm)	Ni (ppm)	Pb (ppm)	V (ppm)	Zn (ppm)	Fe (%)	Mn (ppm)	LOI (%)	Ca (%)	Mg (%)
3997	McFarland	S	25-27	<.2	19	108	59	20	20	138	4.16	208	20.57	3.6	2.7
3998	McFarland	S	29-30	<.2	16	124	53	20	20	137	3.32	184	22.00	3.0	2.4
3999	Swamper	DM & DG	7- 8	0.2	9	37	20	7	10	54	.71	105	30.06	2.1	1.0
4000	Swamper	DM & DG	7	<.2	8	39	24	5	10	60	.60	116	30.42	2.6	0.9
4001	Swamper	DM & DG	8	<.2	11	38	14	5	<10	58	.74	111	29.42	2.2	0.8
4002	East Twin	DM & NS	18-20	<.2	15	68	25	13	<10	73	3.70	378	60.09	2.6	1.1
4003	East Twin	DM & NS	16	<.2	11	99	31	11	20	91	4.45	453	62.41	2.0	1.1
4004	East Twin	DM & NS	15	<.2	12	103	31	7	<10	96	5.95	536	58.31	2.3	1.2
4005	Trout	DG, DM & NS	47	<.2	11	52	20	5	<10	70	1.42	192	24.73	3.1	1.8
4006	Trout	DG, DM & NS	75	<.2	12	59	27	7	<10	74	1.44	177	23.62	4.4	2.3
4007	Trout	DG, DM & NS	46-50	0.2	13	63	27	10	20	101	2.08	299	23.34	4.4	2.4
4008	Cascade	M & NS	10	<.2	15	82	30	5	20	126	2.02	303	31.15	2.5	1.1
4009	Cascade	M & NS	8	<.2	18	94	43	9	10	116	1.57	340	38.90	3.2	1.5
4010	Cascade	M & NS	7-10	<.2	14	69	39	12	10	108	1.45	266	33.48	3.0	1.4
4011	Clara	M & NS	12	<.2	26	63	44	60	10	154	3.28	506	23.18	4.2	2.0
4012	Clara	M & NS	13	<.2	22	60	42	23	20	178	2.94	440	24.64	4.0	1.9
4013	Clara	M & NS	13	<.2	18	62	34	20	20	184	2.63	425	25.50	3.6	1.8
4014	Caribou	M & NS	15	<.2	19	42	30	13	<10	78	1.63	251	32.10	3.4	1.7
4015	Caribou	M & NS	19	<.2	16	44	38	18	20	91	1.76	262	32.72	3.7	1.8
4016	Caribou	M & NS	21-22	<.2	16	41	34	8	20	74	1.44	207	31.70	3.3	1.6

** pH of surface water

COEFFICIENTS OF DETERMINATION (r^2)

	Co	Cu	Ni	Pb	V	Zn	Fe	Mn	Ca	Mg	Al	LOI	pH Water	pH Sediment
LOI	*.09	.03	*.08	*.09	*.07	*.12	.15	.18	*.38	*.30	*.32			
Fe	.22	.54	.31	.17	.06	.32		.50	*.01	.04	.03			
Mn	.32	.18	.17	.20	.04	.37			.01	.01	.07			
Ca	.37	*.01	.18	.22	.05	.21	*.01	.01		.70	.34			
Mg	.30	.09	.42	.18	.16	.26	.04	.01	.70		.50			
Al	.37	.19	.41	.16	.20	.64	.03	.07	.34	.50				
WD	*.02	.00	.00	*.02	*.10	*.01	.00	*.02	.25	.35	.05	*.13	.68	.16
AREA													.19	.49
Cu		.38				.29								

r^2 determined by log y = a + b log x, except water depth (y) where r^2 determined by y = a + b log x, and y = a + bx for lake area, water depth and pH.

* negative relation

WD = water depth at sample site

AREA = area of lake

Sample Number	Al (%)	Water **pH	Sediment pH	Area (square miles)
3997	2.59	7.4	6.8	.73
3998	2.36	7.4	6.7	.73
3999	.87	6.9	6.3	.06
4000	.82			
4001	.98	7.2	6.3	.06
4002	.83	7.2	6.4	.24
4003	1.07			
4004	1.24	7.4	6.6	.24
4005	2.12	7.4	6.7	.38
4006	1.60	7.7	6.5	.38
4007	1.90			
4008	2.41	7.2	6.4	.65
4009	1.90			
4010	1.82			
4011	2.20			
4012	2.39			
4013	2.47			
4014	1.33			
4015	1.40			
4016	1.24			

ROCK TYPE*

S = slate and mafic sills

DG = Duluth Complex granophyre

DM = Duluth Complex mafic

NS = North Shore volcanics

M = mafic intrusive

* Rock types from: Green, J. C., 1972, Bedrock Geologic Map -- Two Harbors Sheet: Minnesota Geological Survey, Open File Map.

Ag, Mo and Ti analyzed but below detection limit (Ag <.01 ppm, Mo <20 ppm and Ti <200 ppm)

All elements analyzed by atomic absorption on unignited sample. Ag, Co, Cu, Mo, Ni, Pb, Ti, V, Zn, Fe and Mn extracted in 4M HNO_3 - 1M HCl. As, Ca, Mg and Al extracted in concentrated HCl. LOI determined by ignition at 800°C.

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