

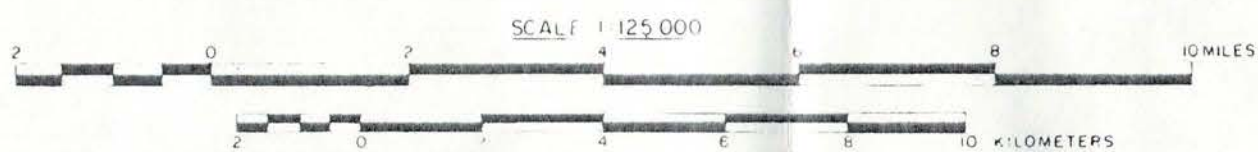
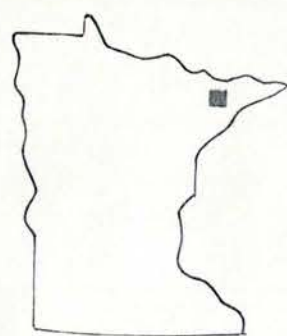
MINNESOTA DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF MINERALS
**PILOT SURVEY OF URANIUM IN ORGANIC-RICH LAKE
 SEDIMENT, ELY REGION, NORTHEASTERN MINNESOTA**

By D.G. Meineke, *T.R. Butz and M.K. Vadis
 D.G. Meineke, Supervisor of Minerals Exploration

● 3659V
 7.50 Sample site with sample number and bedrock geologic abbreviation on top; total uranium in ppm, analyzed by neutron activation, on bottom.

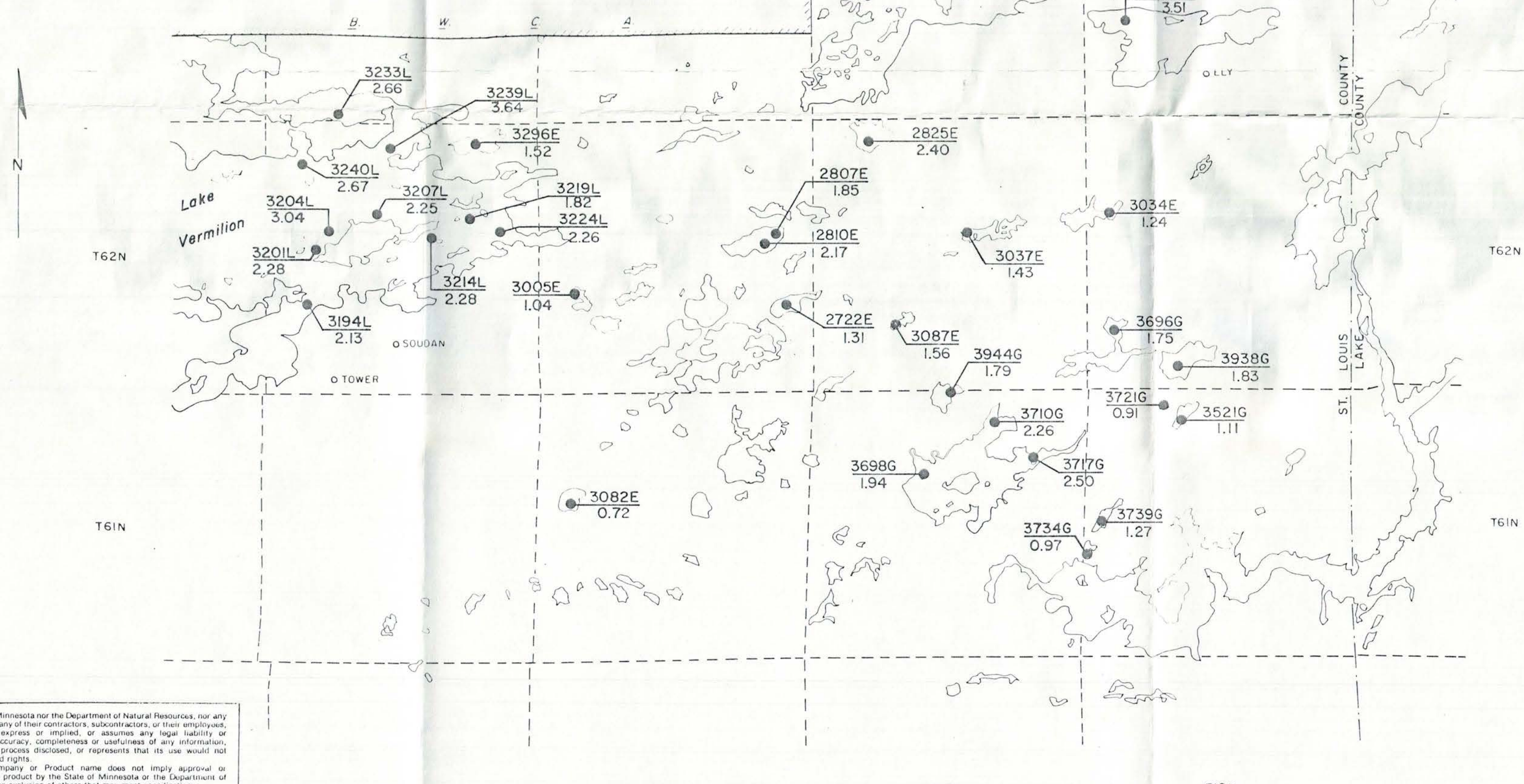
V=Vermilion Massif G=Giants Range Granite E=Ely Greenstone
 N=Newton Lake Formation L=Lake Vermilion Formation

Geology from: Sims, P.K., 1973, Geologic Map of Western Part of Vermilion District
 Northeastern Minnesota: Minnesota Geological Survey Map M-13.



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* Analyses provided by T.R. Butz of the Union Carbide-Nuclear Division of the Oak Ridge Gaseous Diffusion Plant (Box P, Oak Ridge, TN 37830) as part of the National Uranium Resource Evaluation (NURE) Program sponsored by the Energy Research and Development Administration (ERDA). This survey is a cooperative effort between the Division of Minerals and Union Carbide-Nuclear Division to pilot study the use of organic-rich lake sediment as a means of regional uranium resource evaluation for portions of northern Minnesota.



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Sample Number	Lake Name	*Rock Unit	Sample Depth	As (ppm)	Co (ppm)	Cu (ppm)	Ni (ppm)	Pb (ppm)	U (ppm)	Zn (ppm)	Fe (%)	Mn (ppm)	LOI (%)
3579	High	V	30'	0	14	35	34	2	4.95	72	1.46	537	304
3513	Burntside	V	43'	1	10	18	21	6	5.72	53	1.22	287	14.5
3547	Everett	V	13'	0	19	26	40	7	5.91	79	.99	248	37.3
3549	Fenske	V	25'	0	17	25	33	5	5.85	71	1.01	296	37.2
3595	Burntside	V	87'	0	8	20	13	6	6.64	47	.85	266	25.1
3616	Twin	V	21'	0	19	20	34	17	3.16	84	1.44	319	29.3
3629	Sletten	V	40-45'	0	13	22	19	5	3.47	60	1.01	456	53.7
3628	Little Sletten	V	28'	0	20	32	25	9	3.99	66	1.04	407	46.9
3659	Big Lake	V	12'	0	10	17	23	2	7.50	98	.89	232	38.9
3938	One Pine	G	9-10'	0	13	19	55	4	1.83	57	.94	389	40.0
3696	Johnson	G	6'	0	7	15	19	8	1.75	70	.76	162	27.7
3739	Perch	G	12'	0	8	30	18	8	1.27	63	.81	267	46.8
3944	Muckwa	G	6-8'	1	11	18	28	2	1.79	65	1.12	265	66.0
3710	Bear Island	G	20-23'	0	17	24	23	6	2.26	93	2.81	1147	31.0
3717	Bear Island	G	27'	0	14	24	17	13	2.50	85	2.53	899	28.1
3698	Bear Island	G	37-40'	0	23	17	24	10	1.94	88	5.08	988	13.0
3521	Blueberry	G	5'	0	5	13	10	3	1.11	38	.51	137	45.5
3721	Canary	G	5'	0	5	9	9	6	.91	26	.20	101	46.3
3734	Whisper	G	16'	0	7	17	10	4	.97	68	.53	174	64.2
3011	Minister	V	13'	1	11	27	21	6	3.84	77	.88	234	39.5
2810	Armstrong	E	30-32'	2	24	76	52	10	2.17	90	4.00	1550	32.17
2722	Eagles Nest #4	E	40'	0	18	49	20	15	1.31	70	5.18	1510	54.48
3087	Purvis	E	13'	3	16	71	73	15	1.56	117	5.38	230	53.90
3005	Pour Mile	E	17'	1	5	65	16	15	1.04	158	1.01	315	65.78
3082	Puclan	E	3'	0	5	27	15	15	.72	48	.40	70	55.56
3037	Twin	E	22'	2	16	66	71	15	1.43	103	3.22	1025	47.61
3034	Mitchell	E	25'	3	17	75	52	10	1.24	123	4.00	715	36.77
2807	Armstrong	E	24-26'	1	13	42	39	15	1.85	55	2.24	900	20.39
3296	Bass	E	17'	3	5	44	8	10	1.52	30	.74	350	74.87
2825	Wolf	E	15-17'	1	15	60	41	15	2.40	127	2.00	725	31.55
3069	Cedar	N	40'	1	8	37	31	20	2.13	20	.91	275	35.09
3066	Cedar	N	25'	1	11	37	40	15	2.24	50	1.18	265	36.42
3676	Camp	N	15-17'	0	11	27	41	6	1.65	69	.87	861	58.80
3610	Browns	N	17'	0	16	37	30	6	2.40	66	1.07	349	38.50
3119	Picketts	N	7-8'	0	11	36	63	0	1.31	70	.18	100	43.97
3146	Burgo	N	20'	0	19	35	97	0	2.07	102	.70	210	32.21
3145	Bright	N	10'	0	7	29	24	0	1.16	60	.20	100	63.84
3064	Cedar	N	30'	1	8	33	37	5	2.23	75	.96	255	34.04
3106	Bass	N	25'	1	7	38	47	5	3.66	100	1.51	590	25.64
3135	Shagawa	N	22'	1	13	36	52	10	3.51	62	1.40	490	32.36
3207	Lake Vermilion	L	50'	1	13	22	25	15	2.25	133	1.90	835	27.64
3201	Lake Vermilion	L	30-34'	2	15	14	21	20	2.28	128	2.06	950	21.60
3214	Lake Vermilion	L	31'	2	20	25	28	15	2.28	90	6.20	1735	26.71
3204	Lake Vermilion	L	32'	1	17	18	27	20	3.04	110	3.08	1185	18.70
3194	Lake Vermilion	L	6'	2	13	18	25	5	2.13	136	2.05	1210	40.41
3224	Lake Vermilion	L	25'	1	9	23	22	10	2.26	100	1.25	650	28.04
3219	Lake Vermilion	L	35'	1	16	27	30	15	1.82	100	2.10	870	26.75
3239	Lake Vermilion	L	25'	2	15	31	36	20	3.64	70	2.10	875	27.41
3240	Lake Vermilion	L	25'	2	17	23	32	5	2.67	105	3.45	1375	20.81
3233	Lake Vermilion	L	15-19'	1	11	27	28	10	2.66	74	1.35	460	30.17

MEANS FOR EACH ROCK UNIT

Rock Unit	As (ppm)	Co (ppm)	Cu (ppm)	Ni (ppm)	Pb (ppm)	U (ppm)	Zn (ppm)	Fe (%)	Mn (ppm)
Vermilion Massif	0	14	24	26	7	5.10	71	1.08	328
Giants Range Granite	0	11	19	21	6	1.63	65	1.53	453
Ely Greenstone	2	13	58	39	14	1.52	92	2.82	739
N = Newton Lake Formation	1	11	35	46	7	2.24	67	0.90	350
L = Lake Vermilion Formation	2	15	23	27	14	2.50	105	2.55	1015

* V = Vermilion Massif

G = Giants Range Granite

E = Ely Greenstone

N = Newton Lake Formation

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All elements, except uranium, analyzed by atomic absorption on unignited sample. Co, Cu, Ni, Pb, Zn, Fe and Mn extracted in 4M HNO₃ - 1M HCl. Arsenic extracted in concentrated HCl. Uranium analyzed by neutron activation. LOI determined by ignition at 800° C.

* Geology from: Sims, P. K., 1973, Geologic Map of Western Part of Vermilion District, Northeastern Minnesota: Minnesota Geological Survey, Map M-13.

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