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EVALUATION UNIT 35 - CHARLEY RIVER AND BLACK RIVER QUADRANGLES, EASTCENTRAL ALASKA: GENERAL GEOLOGY AND GEOCHEMICAL, MAJOR OXIDE, AND LEAD ISOTOPE DATA

by

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INTRODUCTION

Evaluation unit 35 encompasses 2,254 thousand acres in eastcentral Alaska in the Charley River and Black River quadrangles (fig. 1). In June 1993, a reconnaissance assessment of mineral potential in evaluation unit 35 was conducted. In the course of this reconnaissance study, samples were collected and submitted for geochemical analyses (31 samples), major oxide analyses (3 samples), and lead isotope analyses (3 samples). Sample descriptions are given in table 1, geochemical analyses in table 2, major oxide analyses in table 3, and lead isotope analyses in table 4.. Sample locations and the boundary of evaluation unit 35 are plotted at 1:250,000 scale on sheet 1. A summary of the geology and references is also provided.

Table 1. List of samples from Evaluation Unit 35 taken for geochemical and major oxide analyses (latitude and longitude of samples given in tables 1 and 2).

STATION #	GEOCHEM # or *MAJOR OXIDE #	ROCK DESCRIPTION[1]
92JC1	31602	red weathering limestone
92JC7	31603	red weathering quartzite in silicified dolomite
92JC16	31666	limestone (karst?)
92JC17	31667	limestone
92ABD6	1227	dolostone-mudstone blocks in rubble
92KC151	1222	dolomite
92KC152	1223	basalt with quartz & carbonate veins with minor pyrite
92KC152	1224	limestone
92KC154	1225	feldspathic limestone with limonite along quartz veinlets
92KC155	1226	siltstone, sandstone, lenses of chert conglomerate
92KC156	1228	basalt (mafic rocks)
92KC170	31709	pink/gray dolomite
92KC172	31710	soil near orange weathering limestone
92KC172	31711	orange weathering limestone
92KC173	31712	brown/orange soil in carbonate terrain
92KC173	31713	limestone breccia (solution collapse?)
92KC173	31714	limestone
92KC175A	31715	hornfelsed? dark gray quartzite
92KC175A	31716	orange-stained limestone
92KC175A	31717	orange-stained limestone
92KC175A	31718	"heavy" gossan float
92KC175	31719	dolomitic zone in limestone ridge
92KC175	31720	chert-bearing conglomeratic sandstone
92MR4	*588	radiolarian basalt
92MR5	*589	basalt
92MR8	590	phyllitic shale/phyllite
92MR9	591	phyllitic shale/phyllite
92MR10	592	float cobble with iron stained quartz veins
92MR11	593	quartz float
92MR11	594	float of iron-stained float material
92MR22	31606	dolomitic breccia/dolomite with quartz-carbonate veins
92MR22	31607	siliceous dolomite with sulfide(pyrite)
92MR22	31608	brick-red dolomite with calcite-quartz veins
92MR23	*31609	chloritized diorite

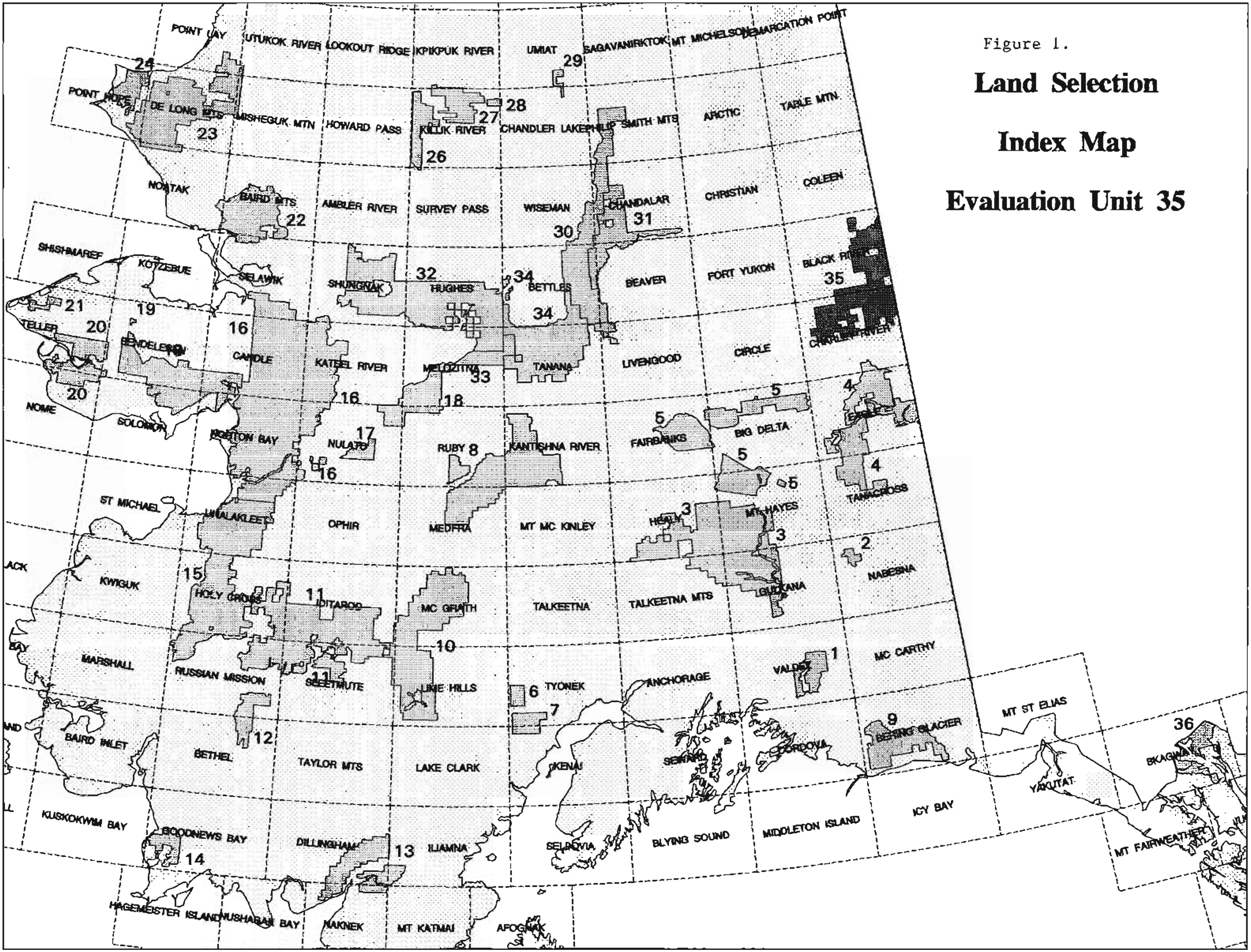
[1] Sample descriptions from field notes.

Figure 1.

Land Selection

Index Map

Evaluation Unit 35



GEOLOGIC SUMMARY

General geologic setting

The evaluation unit can be divided into a northern and southern half based on geology as well as by quadrangles. The southern part of the evaluation unit lies within the Charley River fold and thrust belt (fig. 2), also called the Kandik basin, which has been explored for hydrocarbons. The northern part of the evaluation unit comprises the southern edge of the Porcupine platform (fig. 2). Thick Quaternary surficial deposits of alluvium, colluvium and loess cover most of the lower elevations within the evaluation unit restricting lowland outcropping to river and stream cuts.

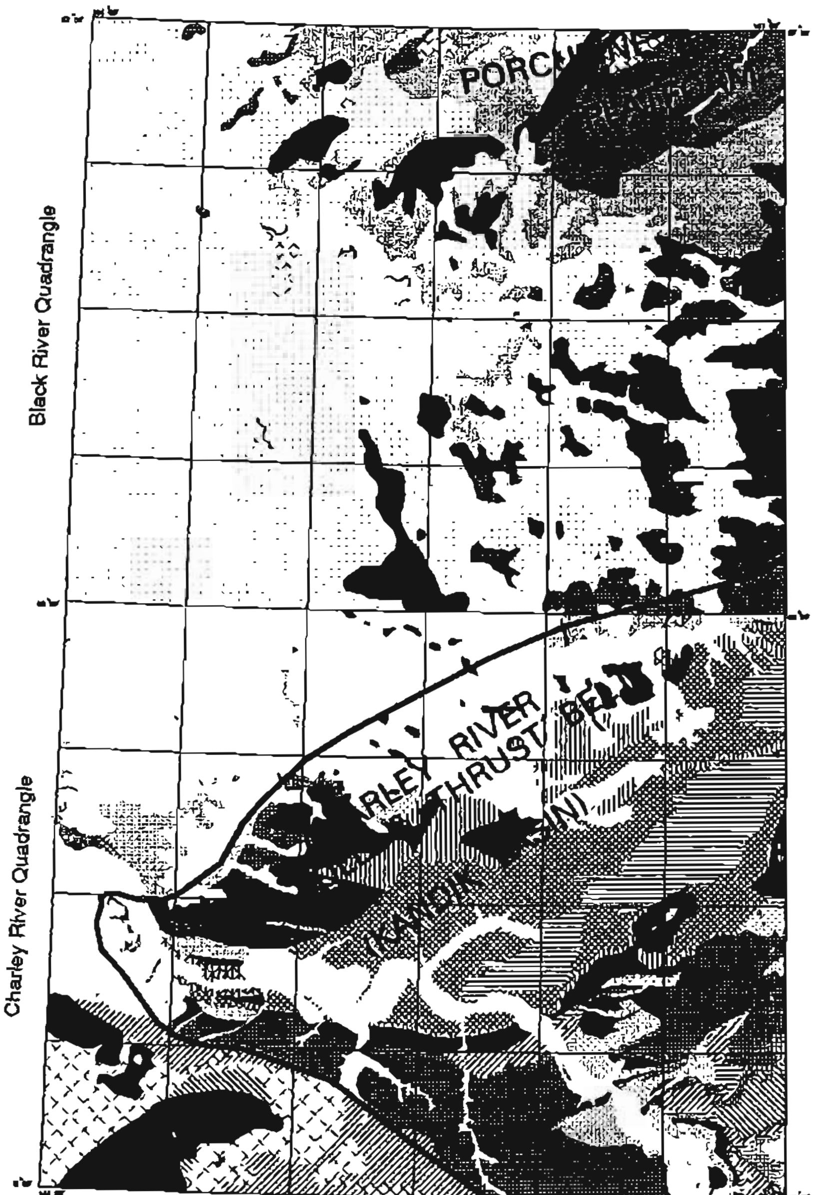
Bedrock geology

The southern half of Evaluation Unit 35 (Charley River Quadrangle) is composed of predominantly sedimentary Precambrian to Tertiary clastic and carbonate rocks (fig. 2), locally metamorphosed to lower greenschist facies, and minor volcanic rocks (Brabb and Churkin, 1969; Dover; 1990; Dover and Miyaoka, 1988). The Charley River fold-and-thrust belt (Dover, 1992) includes: Lower Cretaceous clastic rocks (Kandik Group and Glenn Shale) deposited in the Kandik Basin; Permian limestone (Tahkandit Limestone) and chert pebble conglomerate to chert arenite (Step Conglomerate); Mississippian shale and limestone (Calico Bluff Formation and Ford Lake Shale), and sandstone and conglomerate (Nation River Formation); Devonian chert, shale and limestone (McCann Hill Chert and Ogilvie Formation), and volcanic rocks (Woodchopper Volcanics); Lower Ordovician to Lower Devonian graptolitic shale (Road River Formation); Lower Cambrian to Lower Ordovician limestone (Hillard Limestone); Lower Cambrian argillite (Adams Argillite) and limestone (Funnel Creek Limestone); and Proterozoic limestone, dolomite, sandstone, shale, and basalt (Tindir Group).

The geology of the Black River Quadrangle represents a northerly transition into the southernmost edge of the Porcupine platform, an area of Precambrian-through-middle Paleozoic carbonate and clastic sedimentation (fig. 2). Bedrock consists of unnamed Precambrian-to-middle Paleozoic phyllite, dolomite, limestone, argillite and chert and small Precambrian(?) granitic and basic intrusive rocks (Brabb, 1970). A Quaternary basalt flow occurs at the extreme northern edge of the evaluation unit. Recent reconnaissance paleontologic investigations in the Black River D-1 quadrangle (Blodgett and others, 1992) indicate a link with Ordovician carbonate rocks cropping out to the east in the Yukon Territory and on the northernmost flank of the Brooks Range.

Surficial geology

This region was not glaciated during Pleistocene time (Coulter and others, 1965) but was subjected to intense periglacial weathering when glaciers existed in nearby mountains and isolated uplands in eastern Beringia (Hopkins, 1967; Hopkins and others,



EXPLANATION

- Qal - Alluvial sand and gravel
- Qt - River terrace deposits
- Ql - Loess
- QTb - Basalt
- QTs - Sand
- Kq - Massive quartzite
- KJs - Shale
- PCs - Shale
- Pq - Massive quartzite and chert pebble conglomerate
- Pzv - Volcanic rocks
- DCl - Limestone and dolomite
- Dl - Limestone
- Sl - Limestone
- COl - Limestone
- pCg - Granitic rocks
- pCp - Phyllite
- pCi - Basic intrusive rocks

Source: Brabb, Earl A., 1970, Preliminary geologic map of the Black River Quadrangle, East-Central Alaska: U.S. Geological Survey Map I-601, scale 1:250,000.

EXPLANATION

- Q - Quaternary deposits
- TKs - Sandstone, mudstone and conglomerate
- KTrg - Glenn Shale
- Kb - Biederman Argillite
- Kks - Kathul Graywacke
- Kke - Keenan Quartzite
- Ps - Step Conglomerate
- Pt - Tahkandit Limestone
- Pza - Argillite
- Pzc - Circle Volcanics
- Pzl - Argillite
- MDf - Ford Lake Shale
- Mcb - Calico Bluff Formation
- Mza - Adamellite
- DSOr - Road River Formation
- Dl - Limestone
- Dm - McCann Hill Chert
- Dnr - Nation River Formation
- Dwd - Woodchopper Volcanics, dolomite
- Dwl - Woodchopper Volcanics, limestone
- Dws - Woodchopper Volcanics, shale
- Dwv - Woodchopper Volcanics, basalt and tuff
- OCh - Hillard Limestone
- OCj - Jones Ridge Limestone
- Ca - Adams Argillite
- Cf - Funnel Creek Limestone
- pCd - Dolomite
- pCt - Tindir Group, undivided
- pCu - Sedimentary rocks, undivided
- pCv - Volcanic rocks
- br - Basalt and redbeds
- ds - Dolomite and shale
- dsl - Limestone
- gn - Gneiss
- gs - Greenstone, fine-grained
- gsl - Greenstone, coarse grained
- ls - Limestone
- ms - Mica schist
- ph - Phyllite
- sh - Shale
- sp - Serpentine
- ss - Dolomitic sandstone and shale

Source: Brabb, E.E., and Churkin, Jr., M., 1969, Geologic map of the Charley River Quadrangle, east-central Alaska: U.S. Geological Survey, Map I-573, scale 1:250,000.

Figure 2. Geology of Charley River and Black River Quadrangles

1982). Crests of bedrock ridges were stepped by cryoplanation processes during intense periglaciation, and ridge surfaces are littered with frost-shattered bedrock rubble and coarse, angular colluvium. Loess picked up by winds blowing across nearby braided proglacial streams blankets most of the topography. This silt blanket has been locally eroded by fluvial processes and redeposited as thick organic-rich fills in valley bottoms (Péwé, 1975a,b). The region is underlain by discontinuous permafrost (Ferrians, 1965). Fine-grained valley fills are ice rich as indicated by the widespread distribution of open-system pingos and thaw lakes in these deposits.

Previous geologic investigations

The first geologic investigation in region was a study of the Yukon-Alaska International boundary between the Porcupine and Yukon Rivers (Maddren, 1912; Cairnes, 1914). Kindle (1908) published an earlier reconnaissance study of the Porcupine River valley north of Evaluation Unit 35. Later geologic studies in the region by Mertie (1930, 1933) helped to establish the stratigraphic framework and structural elements of the region. More recent stratigraphic studies were conducted by Churkin and Brabb (1965, 1967), Laudon and others (1966), Brabb (1967, 1969), Lane and Ormiston (1976; 1979), and Coleman (1985). A mineral reconnaissance study in the Porcupine River drainage to the north was published by Barker (1981) and a uranium study of the Black River Quadrangle was published by Hinderman and Ide (1982). Stratigraphic and structural studies in the adjacent Ogilvie River and Porcupine River quadrangles in the Yukon Territory include Norris (1968, 1972, 1976). Stratigraphic, sedimentologic, and paleontologic studies of coeval Ordovician-through-Early Devonian age carbonate rocks in the Charley River A-1, B-1 and C-1 quadrangles and in the adjoining Ogilvie River Quadrangle include Blodgett (1978); Blodgett and Clough (1987); Blodgett and others (1984, 1992); Clough (1980, 1981, 1988); and Clough and Blodgett (1984, 1985, 1987, 1988a,b); and Payne and Allison (1981).

Published 1:250,000-scale geologic maps of the quadrangles in the evaluation unit are by Brabb and Churkin (1969) and Dover and Miyaoka (1988) (Charley River Quadrangle) and Brabb (1970) (Black River Quadrangle). Dover (1992) has recently published a geologic map of the Charley River A-1, A-2, A-3, B-1, B-2, B-3, C-1, and C-2 quadrangles on a single sheet at a scale of 1:100,000. Brosgé and others (1966) published an open-file 1:63,360-scale geologic map of the Porcupine River canyon located north of the evaluation unit. Geologic maps of the adjoining Yukon Territory are the 1:250,000 scale Porcupine River Quadrangle (Norris, 1981) and the Ogilvie River Quadrangle (Norris, 1982).

GEOCHEMICAL ANALYSES

Thirty-one samples were collected from evaluation unit 35 and submitted for geochemical analyses. The analytical results are given in table 2.

Table 2. Geochemistry for land evaluation unit 35 - Charley River / Black River quadrangles.

Element	Method	Units	Limits Lower	Limits Upper	590	591	592	593	594	1222	1223	1224	1225	1226	1227
		Geochem Number			590	591	592	593	594	1222	1223	1224	1225	1226	1227
		Longitude, west			141.721	141.744	141.749	141.753	141.753	143.05	143.059	143.123	143.098	143.09	143.073
		Latitude			65.955	65.954	65.954	65.957	65.957	65.684	65.683	65.658	65.71	65.705	65.589
Au	INAA	PPB	5	10000	-5	-5	-5	-5	-5	-5	-5	-5	-5	11	-5
Ir	INAA	PPB	100	1000	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100
Ag	INAA	PPM	5	300	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Zn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200	400	-200	-200	-200	1700
Co	INAA	PPM	10	20000	-10	-10	-10	-10	-10	-10	64	-10	-10	-10	40
Cd	INAA	PPM	10	2000	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
As	INAA	PPM	1	10000	9	8	1	3	6	-1	1	-1	19	15	534
Sb	INAA	PPM	0.2	9999	1.3	0.8	0.7	0.3	0.7	0.2	0.2	-0.2	4.8	9	47.8
Fe	INAA	PCT	0.5	10	2.4	2.7	-0.5	1.5	5.6	-0.5	10	-0.5	2.9	7	10
Se	INAA	PPM	10	30000	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Te	INAA	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
Ba	INAA	PPM	100	20000	570	790	-100	-100	100	110	-100	-100	350	3100	150
Sn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200
Cs	INAA	PPM	1	10000	5	7	-1	-1	1	-1	-1	-1	-1	6	-1
AG	ICP	PPM	0.5	50	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	1.5	-0.5
Cu	ICP	PPM	1	20000	16	13	4	19	26	1	88	2	21	64	85
Pb	ICP	PPM	2	10000	18	26	11	8	18	11	19	17	11	34	220
La	INAA	PPM	5	30000	29	33	-5	-5	-5	-5	9	-5	8	24	-5
ZN	ICP	PPM	2	20000	51	52	3	17	64	3	108	3	7	29	1222
Mo	ICP	PPM	1	20000	2	1	-1	-1	-1	-1	4	-1	10	13	72
Ni	ICP	PPM	1	20000	19	32	3	5	5	-1	73	1	6	15	104
Co	ICP	PPM	1	20000	-1	-1	-1	-1	-1	-1	38	-1	-1	-1	25
Sm	INAA	PPM	0.2	2000	4.4	4.8	0.3	0.9	0.6	-0.2	3.4	-0.2	1	4.5	0.4
Cd	ICP	PPM	2	2000	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Bi	ICP	PPM	5	2000	-5	-5	-5	-5	-5	-5	16	25	-5	-5	-5
As	ICP	PPM	5	2000	-5	-5	-5	-5	-5	-5	11	30	-5	12	440
Tb	INAA	PPM	1	30000	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
SB	ICP	PPM	5	2000	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Fe	ICP	PCT	0.01	10	1.74	1.89	0.4	1.15	4.42	0.07	8.46	0.03	2.53	5.36	10
Mn	ICP	PPM	5	20000	13	29	-5	-5	6	10	1344	54	13	14	272
Te	ICP	PPM	25	2000	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Ba	ICP	PPM	5	2000	404	617	33	53	76	92	36	13	299	2000	171
Yb	INAA	PPM	5	2000	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
CR	ICP	PPM	2	20000	97	124	15	20	22	13	109	3	67	152	20
Lu	INAA	PPM	0.5	2000	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
V	ICP	PPM	2	2000	110	167	7	14	25	2	337	14	258	793	72
Sc	INAA	PPM	0.5	2000	10	13	-0.5	1.2	1.8	-0.5	45	-0.5	3.9	11	1.7
SN	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	30
Hf	INAA	PPM	2	30000	9	7	-2	-2	-2	-2	3	-2	4	5	-2
W	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
Ta	INAA	PPM	1	2000	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1
LI	ICP	PPM	2	2000	43	54	33	31	6	5	11	-2	8	12	-2
GA	ICP	PPM	10	2000	14	19	-10	-10	-10	-10	26	-10	-10	17	20
U	INAA	PPM	0.5	2000	2.8	3.4	-0.5	0.6	0.8	-0.5	0.5	1	3.6	8.4	1
LA	ICP	PPM	5	2000	9	17	-5	-5	-5	-5	-5	-5	-5	20	-5
Ta	ICP	PPM	5	2000	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100
Ti	ICP	PCT	0.01	10	0.33	0.38	-0.01	0.03	0.05	-0.01	0.68	-0.01	0.09	0.25	-0.01
Al	ICP	PCT	0.01	10	2.73	2.9	0.29	0.47	0.84	0.1	5.46	0.09	0.8	4.38	0.81
MG	ICP	PCT	0.01	10	0.21	0.34	0.03	0.02	0.03	0.29	3.56	9.25	0.07	0.32	0.13
CA	ICP	PCT	0.01	10	0.04	0.03	0.02	0.05	-0.01	0.48	9.2	10	0.06	0.06	0.27
NA	ICP	PCT	0.01	10	0.45	0.57	0.05	0.13	0.09	0.03	1.4	0.11	0.1	0.18	0.86
K	ICP	PCT	0.01	10	0.88	0.98	0.04	0.12	0.17	0.02	0.27	0.04	0.31	1.41	0.42
Nb	ICP	PPM	5	2000	9	10	-5	-5	-5	-5	-5	-5	-5	-5	22
Sr	ICP	PPM	1	2000	83	119	5	12	12	5	75	38	7	62	12
Na	INAA	PCT	0.05	10	0.49	0.59	-0.05	-0.05	0.08	-0.05	1.4	0.11	-0.05	0.07	-0.05
Y	ICP	PPM	5	2000	5	8	-5	-5	-5	-5	12	-5	-5	13	-5
Zr	ICP	PPM	5	2000	70	83	-5	10	15	-5	38	-5	42	76	24
Pb	AA	PPM	2	10000	11	17	-2	-2	5	-2	4	5	5	18	110
Bi	AA	PPM	1	2000	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Te	AA	PPM	0.2	100	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
Br	INAA	PPM	1	30000	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	18
Rb	INAA	PPM	10	10000	110	160	-10	10	22	-10	-10	-10	22	130	-10
Zr	INAA	PPM	500	10000	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
Cr	INAA	PPM	50	30000	160	170	-50	-50	-50	-50	230	-50	68	240	-50
Eu	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Mo	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	-2	-2	12	11	71
Ni	INAA	PPM	20	30000	26	55	-20	-20	-20	-20	100	-20	-20	-20	140
Th	INAA	PPM	0.5	3000	9.5	11	-0.5	1	1.6	-0.5	2	-0.5	3	8.1	-0.5
W	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Ce	INAA	PPM	10	30000	78	70	-10	-10	-10	-10	16	-10	14	38	-10

Table 2. Geochemistry for land evaluation unit 35 - Charley River / Black River quadrangles.

Element	Method	Units	Limits Lower	Limits Upper							
		Geochem Number			1228	31602	31603	31606	31607	31608	31610
		Longitude, west			141.527	143.22	143.068	141.136	141.136	141.136	141.44
		Latitude			65.927	65.611	65.591	66.762	66.762	66.762	65.514
Au	INAA	PPB	5	10000	-5	-5	-5	-5	-5	-5	-5
Ir	INAA	PPB	100	1000	-100	-100	-100	-100	-100	-100	-100
Ag	INAA	PPM	5	300	-5	-5	-5	-5	-5	-5	-20
Zn	INAA	PPM	200	30000	350	-200	-200	-200	-200	1000	30000
Co	INAA	PPM	10	20000	45	12	-10	-10	-10	13	-10
Cd	INAA	PPM	10	2000	-10	-10	-10	-10	-10	-10	1320
As	INAA	PPM	1	10000	3	58	22	-1	1	2	3
Sb	INAA	PPM	0.2	9999	0.5	1.1	3.9	-0.2	0.3	1.1	-0.2
Fe	INAA	PCT	0.5	10	10	5.2	3.5	0.6	2	3.8	-0.5
Se	INAA	PPM	10	30000	-10	-10	-10	-10	-10	-10	-10
Te	INAA	PPM	20	2000	-20	-20	-20	-20	-20	-20	75
Ba	INAA	PPM	100	20000	170	840	1300	-100	-100	-100	-210
Sn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200	-200
Cs	INAA	PPM	1	10000	-1	2	-1	-1	-1	-1	3
AG	ICP	PPM	0.5	50	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Cu	ICP	PPM	1	20000	126	10	9	11	11	9	20
Pb	ICP	PPM	2	10000	23	25	32	12	8	13	697
La	INAA	PPM	5	30000	9	29	14	-5	-5	-5	8
ZN	ICP	PPM	2	20000	109	74	5	33	17	667	20000
Mo	ICP	PPM	1	20000	4	-1	-1	-1	4	-1	125
NI	ICP	PPM	1	20000	24	18	3	3	4	13	20
Co	ICP	PPM	1	20000	28	8	-1	2	4	8	3
Sm	INAA	PPM	0.2	2000	5.1	5.3	1.5	0.4	1.2	2.9	1.2
Cd	ICP	PPM	2	2000	-2	-2	-2	-2	-2	-2	1499.2
BI	ICP	PPM	5	2000	10	15	-5	24	27	26	260
As	ICP	PPM	5	2000	14	24	-5	32	-5	28	119
Tb	INAA	PPM	1	30000	1	-1	-1	-1	-1	-1	-1
SB	ICP	PPM	5	2000	-5	-5	-5	-5	-5	-5	117
Fe	ICP	PCT	0.01	10	8.16	3.99	2.81	0.44	1.42	2.82	1.43
Mn	ICP	PPM	5	20000	1344	469	33	198	696	1085	328
Te	ICP	PPM	25	2000	-25	-25	-25	-25	-25	-25	108
Ba	ICP	PPM	5	2000	130	573	964	22	17	20	47
Yb	INAA	PPM	5	2000	-5	-5	-5	-5	-5	-5	-5
CR	ICP	PPM	2	20000	53	45	25	3	6	9	28
Lu	INAA	PPM	0.5	2000	0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
V	ICP	PPM	2	2000	348	110	16	19	21	22	15
Sc	INAA	PPM	0.5	2000	38	8.5	1.8	-0.5	1.1	1.6	1.6
SN	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	66
Hf	INAA	PPM	2	30000	3	9	11	-2	-2	-2	-5
W	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	383
Ta	INAA	PPM	1	2000	-1	-1	-1	-1	-1	-1	-1
LI	ICP	PPM	2	2000	11	38	3	-2	2	-2	-2
GA	ICP	PPM	10	2000	26	16	-10	17	20	21	14
U	INAA	PPM	0.5	2000	0.7	2.8	1.4	0.7	0.6	0.7	-0.5
LA	ICP	PPM	5	2000	5	22	11	-5	-5	-5	8
Ta	ICP	PPM	5	2000	-100	-100	-100	-100	-100	-100	-100
Ti	ICP	PCT	0.01	10	0.81	0.32	0.08	-0.01	0.01	0.02	0.02
Al	ICP	PCT	0.01	10	7.46	2.35	0.55	0.21	0.39	0.57	0.19
MG	ICP	PCT	0.01	10	2.48	0.36	0.07	10	10	10	0.11
CA	ICP	PCT	0.01	10	6.42	10	0.16	10	10	10	0.7
NA	ICP	PCT	0.01	10	3.87	0.19	0.03	0.21	0.2	0.22	0.03
K	ICP	PCT	0.01	10	0.42	0.62	0.21	0.11	0.16	0.23	0.08
Nb	ICP	PPM	5	2000	5	10	-5	6	7	6	-5
Sr	ICP	PPM	1	2000	341	174	6	21	23	48	4
Na	INAA	PCT	0.05	10	4	0.08	-0.05	0.18	0.18	0.17	-0.05
Y	ICP	PPM	5	2000	18	10	-5	-5	-5	7	13
Zr	ICP	PPM	5	2000	58	89	78	-5	6	8	-5
Pb	AA	PPM	2	10000	6	13	16	6	6	8	539
Bi	AA	PPM	1	2000	-1	-1	-1	-1	-1	-1	-1
Te	AA	PPM	0.2	100	-9	-9	-9	-0.2	-0.2	-0.2	-9
Br	INAA	PPM	1	30000	-1	-1	-1	2	4	-1	-2
Rb	INAA	PPM	10	10000	10	44	14	-10	-10	-10	55
Zr	INAA	PPM	500	10000	-500	-500	-500	-500	-500	-500	-1800
Cr	INAA	PPM	50	30000	78	72	-50	-50	-50	-50	200
Eu	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	-2
Mo	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	5
Ni	INAA	PPM	20	30000	32	-20	-20	-20	-20	-20	-110
Th	INAA	PPM	0.5	3000	0.8	13	4	-0.5	-0.5	0.9	-1.1
W	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	7
Ce	INAA	PPM	10	30000	18	75	35	-10	-10	-10	-46

MAJOR OXIDE ANALYSES

Three samples were collected from evaluation unit 35 and submitted for major oxide analyses. The analytical results are given in table 3.

Table 3. Major oxides for land evaluation unit 35 - Charley River / Black River quadrangles.

	Sample Number	588	589	31609
	Longitude, west	143.055	143.059	141.094
	Latitude	65.685	65.686	66.423
Oxide	UNITS			
NA2O	%	2.25	2.25	2.47
MGO	%	7.17	6.84	5.87
AL2O3	%	13.5	13.4	15.2
SIO2	%	47.7	47.1	49.4
P2O5	%	0.15	0.15	0.49
K2O	%	0.39	0.34	1.63
CAO	%	10.3	10.5	8.51
TIO2	%	1.57	1.59	1.97
CR	PPM	177	176	154
MNO	%	0.22	0.22	0.17
FEO	%	10.5	10.7	6.6
FE2O3	%	14	14.5	10.9
RB	PPM	19	30	66
SR	PPM	157	108	434
Y	PPM	29	14	25
ZR	PPM	65	81	203
NB	PPM	24	39	46
BA	PPM	84	53	757
LOI	%	2.65	2.9	2.9
SUM	%	99.972	99.856	99.713

LEAD ISOTOPE ANALYSES

Three samples were analyzed for lead isotopes by Richard Hurst of Chempet Research Corporation, 330 N. Zachary Avenue, Suite 107, Moorpark, California 93021. The results of these analyses are given in table 4. Their analytical method: 1-3 mg of sample were extracted using 6.2 N HCL + 8N HNO3 (4:1 ratio). Lead was separated using anion exchange chromatography (HBr and HCl methods). Lead isotopic compositions were measured on a 30 cm radius, 90 degree sector TIMS. Isotopic fractionation ranged from 0.040 to 0.081% per atomic mass unit during the course of this study as measured relative to NBS SRM 981 lead (R. Hurst, written communication, 1992).

Table 4. Lead isotope analyses

Sample #	Long(W)	Lat(N)	206Pb/204Pb	207Pb/204Pb	208Pb/204Pb
31709	141.5246°	66.4371°	17.937(5)	15.535(3)	37.644(10)
31718	141.1418°	66.7659°	22.743(4)	15.544(2)	37.638(16)
1227	143.0733°	65.5894°	18.170 (3)	15.526(1)	37.727(18)

<u>Sample descriptions</u> (Geochemical analyses of these samples are listed in table 2)

31709 (92KC170) - Dense gossan from 2' by >60' fracture zone in gray and pink dolomite.
31718 (92KC175A) - Dense gossan in limestone talus.
1227 (92ABD6) - Dense gossan in dolostone talus.

Errors are quoted at the 1 sigma standard error of the mean and occur in the last decimal place(s), e.g. 19.100(10) = 19.100 ± 0.010. All Pb isotopic results are corrected for isotopic fractionation relative to NBS SRM 981--corrections are 0.05%/mass unit. Lead concentrations are accurate to 5% as determined by replicate analyses of NIST SRM Pb standards (277, 1646, 1633a).

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