Grade and Tonnage Data Used to Construct Models for the Regional Alaskan Mineral Resources Assessment Program

by

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Introduction

In early 1978, the U.S. Geological Survey published four regional studies (U.S.G.S. Open-file Reports 78-1A to E) describing the metalliferous mineral resource potential of 80 percent of the State of Alaska. These studies were part of the Regional Alaskan Mineral Resource Assessment Program (RAMRAP). Basic steps in these reports included delineation of areas favorable or permissive for various types of mineral deposits, estimation of the number of deposits of each type within each delineated area where possible, and for 11 deposit types, construction of grade-tonnage or contained metal models. Because of space and time limitations, documentation of the criteria for the selection of deposits used in the grade-tonnage models, grade and tonnage values, sources of information, and limitations of the grade and tonnage values were not included in the reports; this paper meets these needs.

Tonnages and average grades of incompletely explored deposits are seldom well known and, of course, are not known for unfound deposits. Variation of grades and tonnages of well-explored deposits is quite large but much of this variation is due to differences in deposit types. Within specified deposit types the variation can be much less and can be represented by frequency destributions of grade and tonnage for well-explored deposits of each type. Frequency distributions of this type were used in the mineral resource reports of Alaska as models of tonnages and average grades of the yet-to-be discovered and incompletely explored deposits. Thus the assertion that an area is geologically favorable for the occurrence of a specified type of mineral deposit can be further defined by quantitative information about the quality and quantity

of mineral commodities contained in such deposits.

Total tonnages and average grades for known deposits were calculated on the basis of past production plus estimated reserves or, where available, estimated resources. These estimates, plus deposit names, general locations, and data sources are listed in this report in tables for each of the deposit types for which models were constructed (Tables 1-10). Preceding each table is a short description of the criteria used to classify the deposits. Data used in the grade-tonnage or contained-metal models for the following deposit types are presented; podiform chromite, porphyry copper, porphyry molybdenum, skarn tungsten, mercury, nickel in small intrusions, vein gold, mafic volcanogenic sulfide, felsic and intermediate volcanogenic sulfide, and skarn copper. Data sources for each table are listed separately at the end. Location codes are listed in Table 11. Revised grade-tonnage models are presented in Table 12. A discussion of errors that can exist in this type of data is provided in the following section.

Data Errors

Because the grade-tonnage models are supposed to add information about the mineral resource potential of an area, it is important that models of grades and tonnages be representative of those that occur in the delineated areas. The models may not be representative if the wrong deposit type model is applied to an area, or if the grades or tonnages used to construct the model are not representative of the deposit type. With careful consideration of the geology and known deposits of an area, such as was the case in the mineral resource assessments of Alaska, errors due to misspecification of deposit types tend to be quite small. Errors

due to non-representative grades or tonnages can be a result of the incorrect values of properly classified deposits or of incorrectly classified deposits used in the models.

A deposit of one type can be placed with a group of deposits of another type through a classification mistake. Combinations of host and associated rock types, contained metals, mineralogy, geologic settings, and comparison with recognized mineral deposits of each type were used to identify deposits that belonged to the various deposit types. Mistakes in classification can be a result of errors in the geologic description of a deposit in the literature or in our interpretation of the geologic description. A few errors of both types probably exist in the data sets presented here. It is unlikely, however, that discovery and correction of these errors would significantly change the grade-tonnage models used in the resource assessments.

Errors related to incorrect deposits used in the models can also be due to unrecognized regional differences in grades and/or tonnages within a mineral deposit type. Regional differences in grades and/or tonnages are known to exist for porphyry copper deposits and for podiform chromite deposits and may exist but not be recognized for some of the other deposit types.

Incorrect values can come about in several ways and may cause the grade-tonnage model developed from the values to not be representative of the population of interest. Although reporting errors exist in the literature, gross errors are usually detected by plotting the data and by examining data from several sources.

A final source of error is due to the effects of economics on the

quality of data available. Grade and tonnages estimates are usually based on drilling of the deposits. Because of the expense involved in drilling, mining concerns commonly drill enough holes to prove or disprove the economic viability of the mining the deposit. This process can lead to a tonnage, and in some cases a grade estimate that is biased with respect to the grade and tonnage of the mineralized rock in a deposit. Within individual deposits, tonnage estimates tend to be biased downword and grade estimates biased upward. A related problem is the tendency of lower grade deposits not to be reported because they may not be economic to mine at the time they are explored. Balancing these biases to some extent is the inclusion of past production which, for older deposits at or near depletion, tends to reduce the biases. For the more recently discovered and the larger tonnage deposits, drilling and the resultant estimates are often more complete because mining concerns attempt to develop long-range mine plans now. It is also more common in recent years for governments and private industry to report grades and tonnage estimates of uneconomic deposits.

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Podiform Chromite

Chromite deposits were classified as podiform if their form was that of lenticular or approximately tabular pods occuring in irregular peridotite masses or peridotite-gabbro complexes of the alpine type. Data used for the RAMRAP podiform chromite model were all from California because of reported similarities of the California deposits to many in Alaska and because of the excellent documentation of the California deposits. Reported grades should be used with caution; they may represent the shipped grade which had been concentrated or the grade in place. A few of the grades and tonnages from the larger deposits represent the combination of several deposits from a district. Reports of multiple grades from different parts of a deposit were handled by recalculating the grades and tonnages to an average grade for the total tonnage.

Table 1.--Chromite Deposits from California

(data sources listed in references)

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Newmon Mine	Alameda	48	1.5×10^3
Allan (Johnson Lease)	Amador	40	6.3×10^1
Courtwright (Daggett Lease)	...do...	40	6.0×10^1
Courtwright	...do...	39	1.16×10^2
Detert	...do...	38	1.9×10^2
Ellis	...do...	40	6.0×10^1
Kremmel and Froelich	...do...	33	3.57×10^2
Wait	...do...	38	2.5×10^2
Anti-Axis	Butte	41	3.7×10^1
Big Bend	...do...	48	9.0×10^1
Big Pine Claim	...do...	32	2.25×10^2
Christain Place	...do...	53	3.1×10^1
Dickey and Drisbach Prospect	...do...	35	3.0×10^1
Green ridge	...do...	35	9.4×10^1
Hendricks No. 2	...do...	14	8.93×10^2
Lambert	...do...	42	3.3×10^3
Liberty Bond Claim	...do...	28	3.3×10^1
Little Hope	...do...	41	8.5×10^1
Mary Jane	...do...	37	4.1×10^1
North Star (Red Mtn)	...do...	37	1.35×10^2
Parkeson	...do...	41	3.1×10^1
Park's Ranch	...do...	40	5.2×10^2
P.U.P.(Zenith)	...do...	36	1.15×10^3
Simmons	...do...	36	7.7×10^1
Stewart	...do...	52	1.26×10^2
Suzy Bell (Lucky Strike)	...do...	38	3.0×10^2
Swayne	...do...	32	9.0×10^2
War Bond	...do...	35	5.0×10^1
War Eagle and Miller Deposits	...do...	13	2.0×10^4

Deposit	Location (County)	Grade (percent Cr_2O_3)	Tonnage (Metric tons)
Gillan	Calaveras	33	1.4×10^2
Fields and Stoker	...do...	43	2.12×10^2
Ellingwood	...do...	38	5.0×10^2
Bowie Estate	...do...	37	4.0×10^2
American Asbestos Co.	...do...	35	1.0×10^2
Clary and Langford	...do...	46	3.48×10^2
Holbrook and McGuire	...do...	47	8.5×10^2
Liberty	...do...	48	3.25×10^2
Madrid	...do...	32	1.4×10^3
Mayflower	...do...	48	6.67×10^2
Maxwell	...do...	47	3.3×10^1
Valenti	...do...	28	2.0×10^2
Vogelgesang	...do...	44	2.38×10^2
Walker	...do...	40	7.1×10^1
Ward and Lyons	Del Norte	31	2.0×10^3
Alyce and Blue Jay Claims	...do...	49	4.0×10^1
Apex	...do...	38	1.0×10^1
Big Dipper (Robr)	...do...	42	3.39×10^2
Bonanza	...do...	51	1.49×10^2
Chrome Hill No 1	...do...	46	2.0×10^1
Coon Mt. Nos. 1-3	...do...	40	5.7×10^1
Copper Creek (Low divide)	...do...	41	3.35×10^3
Fourth of July	...do...	38	4.0×10^2
French Hill	...do...	45	2.04×10^4
High Dome	...do...	45	2.95×10^2
High Plateau	...do...	53	1.5×10^4
Judy (Hicks)	...do...	44	3.85×10^2
Muzzleloader (Stevens No.1)	...do...	50	1.69×10^2
Lone Gravel	...do...	42	2.8×10^2
Mt. View	...do...	42	9.35×10^3
Rattlesnake Mt.	...do...	42	3.36×10^3
Richey, U.S. and S.J.	...do...	40	2.3×10^1

Deposit	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
St. Patrick (Camp 8)	Del Norte	40	1.27×10^2
Skyline Mine	...do...	47	1.2×10^3
Sunrise	...do...	51	4.89×10^2
Toujours Gai	...do...	47	2.64×10^2
White Feather	...do...	38	6.5×10^1
Apex	El Dorado	45	8.0×10^0
Darrington	...do...	45	2.2×10^4
Gold Bug Claims	...do...	40	2.0×10^2
Green Mine	...do...	47	1.5×10^2
Helemar	...do...	38	8.7×10^1
Hill-Top Chrome	...do...	45	9.0×10^0
Hoff	...do...	31	2.0×10^2
Murphy	...do...	10	5.0×10^3
Pillikin	...do...	43	1.1×10^5
Shelly	...do...	30	1.28×10^3
Sheppard Mine	...do...	34	1.2×10^2
Simon	...do...	35	1.05×10^2
Stafford	...do...	45	1.98×10^2
Alice Mine	Fresno	40	4.5×10^1
Black Bow Claim (Avery)	...do...	29	1.8×10^1
Blue Brush	...do...	42	2.7 c 10^1
Butler, Estate chrome, etc.	...do...	46	2.3×10^4
Camden Mine	...do...	41	1.2×10^2
Clara H	...do...	43	6.65×10^3
Chrome Gulch Group	...do...	40	3.0×10^2
Jack Sprat Group	...do...	30	3.19×10^3
Lacey	...do...	44	3.73×10^3
Letty	...do...	44	2.0×10^1
Long Ledge Group	...do...	10	9.2×10^3
Lotty	...do...	44	1.5×10^1
Little Rock Mine	...do...	25	2.0×10^1
Lucky Boy	...do...	34	1.2×10^2

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Manchester Mine	Fresno	44	3.5×10^1
McCurty	...do...	35	3.14×10^2
Red Slide Group	...do...	42	2.5×10^2
Rock Wren Mine	...do...	15	1.25×10^3
Rose Claims	...do...	35	1.2×10^2
Saint	...do...	44	1.27×10^2
Sunset	...do...	41	1.0×10^2
Black Diamond or Grey Eagle Group	Glenn	46	3.96×10^4
Binder No. 1	Humboldt	46	5.0×10^0
Blue Creek Tunnel	...do...	46	2.4×10^1
Lassic Peak	...do...	47	3.0×10^0
Pecwan	...do...	42	7.3×10^1
Pyramid	...do...	45	7.6×10^1
White Cedar	...do...	45	2.85×10^2
Wilder (Fish Creek)	...do...	40	1.45×10^2
Black Bart (Great Western)	Lake	48	4.0×10^2
Butler Claims	...do...	45	1.6×10^1
Gunn Claims	...do...	38	2.4×10^1
Harp and Sons Ranch Deposits	...do...	51	5.0×10^1
Kangaroo Court Mines	...do...	40	1.5×10^1
Sutro Mine	...do...	43	1.2×10^1
Lucky Strike Mine	...do...	48	1.5×10^3
Daisy (Aldelabron)	Monterey	47	3.0×10^2
Elder Claim	Napa	45	2.0×10^1
Moore Mine	...do...	40	44.6×10^2
Mullaly Mine	...do...	47	8.5×10^1
Nichelini Mine	...do...	45	2.0×10^3
Alta Hill	Nevada	34	1.77×10^2
Bowden Prospect	...do...	18	1.0×10^2
Codd Prospect	...do...	15	7.1×10^1
Dickerson	...do...	35	6.0×10^0
Eden	...do...	25	5.0×10^0

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Geach	Nevada	34	4.3×10^1
Gillis Prospect	...do...	62	2.2×10^1
Half Chrome	...do...	35	1.96×10^2
Holseman (and others)	...do...	14	8.79×10^2
Merrifield	...do...	36	2.5×10^1
Moscatelli No. 1	...do...	42	1.4×10^2
Moscatelli No. 2	...do...	41	5.0×10^1
Mulcahy Prospect	...do...	38	2.0×10^1
Olsen	...do...	40	2.0×10^1
Porter Property	...do...	32	9.0×10^2
Red Ledge	...do...	42	1.27×10^3
Spring Hill	...do...	57	1.0×10^1
Snyder	...do...	40	2.0×10^2
Tomkin	...do...	37	1.1×10^1
Waite	...do...	36	4.25×10^2
Wolf Creek Area	...do...	38	5.4×10^1
Beat	Placer	55	5.0×10^2
Boiler Pit	..do...	45	1.2×10^3
Black Rock Chrome	...do...	48	1.05×10^2
Bunker	...do...	40	1.63×10^3
Buttercup Chrome	...do...	43	1.5×10^2
Esther and Phyllis	...do...	46	2.16×10^2
Fiddler's Green	...do...	32	1.0×10^1
Gas Canyon	...do...	34	7.5×10^1
Green (Americus)	...do...	34	2.5×10^1
Green's Capco Leases	...do...	48	2.51×10^2
Hodge Ranch	...do...	35	2.5×10^2
Horseshoe	...do...	47	7.5×10^1
Julian	...do...	33	4.0×10^0
Maralls' Capco Leases	...do...	55	1.71×10^2
Mountain View Group	...do...	48	1.31×10^2
New Hope	...do...	56	6.5×10^1
North Fork Chrome	...do...	46	2.18×10^2

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Parker	Placer	11	5.5×10^3
Poco Tiempo Quartz	...do...	40	3.5×10^1
Randall	...do...	51	5.5×10^1
Snakehead (Jumbo)	...do...	47	6.5×10^1
Southern Pacific property	...do...	39	1.8×10^2
Sunset	...do...	55	5.61×10^2
Washout	...do...	45	4.71×10^2
West Chrome	...do...	45	2.82×10^2
Cattle Springs	Plumas	39	7.15×10^1
Chicago	...do...	42	1.6×10^1
Clover Leaf	...do...	43	2.5×10^1
Commander	...do...	39	2.3×10^1
Diamond	...do...	46	2.2×10^1
Edeline	...do...	47	6.0×10^0
Hudson (Fuller Claims)	...do...	45	1.1×10^1
Jack Forth	...do...	36	4.2×10^1
Mc Carty	...do...	40	2.0×10^2
Poodle Dog	...do...	37	2.2×10^1
Skyline No. 1	...do...	43	1.2×10^1
Skyline No. 2	...do...	46	3.8×10^1
Spot	...do...	42	6.0×10^1
White Pine Mine	...do...	49	5.5×10^2
Wolf Creek	...do...	32	2.4×10^2
Western Magnesite	Santa Clara	35	2.0×10^1
El Primero	San Luis Obispo	30	3.25×10^2
Castro Mine	...do...	43	4.93×10^4
Zerfirg Ranch	...do...	46	1.0×10^1
Pine Mt. Claims	...do	38	8.5×10^1
Trinidad	...do...	45	1.6×10^3
Sousa Ranch	...do...	45	8.3×10^1
Norcross	...do...	50	2.49×10^3
Lucky Strike Mine	...do...	43	8.3×10^1
Victory No. 3	...do...	41	2.8×10^1

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Sweetwater	San Luis Obispo	46	1.04×10^3
Sunshine	...do...	38	3.9×10^1
(unnamed)	...do...	51	2.1×10^3
Shotgun Creek	Shasta	44	2.99×10^3
Round Bottom	...do...	49	4.71×10^2
Little Castle Creek Mine	...do...	46	1.67×10^4
Forest Queen	...do...	43	1.88×10^3
Dorriss	Sierra	45	7.5×10^1
Finan	...do...	47	8.0×10^0
Gibsonville	...do...	44	2.62×10^2
Golconda Fraction	...do...	39	1.2×10^2
Milton	...do...	41	2.5×10^2
Oxford	...do...	38	4.0×10^3
Roupe	...do...	44	4.0×10^2
White Bear	...do...	41	3.75×10^2
Coggins	Siskiyou	39	4.22×10^3
Cyclone Gap	...do...	47	2.4×10^3
Doe Flat	...do...	36	2.4×10^3
Dozier	...do...	42	4.65×10^2
Elk Creek Claim	...do...	41	1.87×10^2
Fairview	...do...	39	2.26×10^3
Hayden and Hilt	...do...	50	6.9×10^1
Josephine	...do...	45	1.0×10^3
McGuffy Creek Group	...do...	55	8.25×10^3
Moffett Creek Group	...do...	49	4.25×10^2
Peg Leg (Lambert)	...do...	54	6.31×10^2
Seiad Creek (Mt. View)	...do...	36	6.0×10^4
Snowy Ridge	...do...	39	2.98×10^2
Laton Mine	Sonoma	48	3.0×10^3
Madeira	...do...	34	1.0×10^2
Meeker (Sonoma Chrome, Inc)	...do...	40	2.0×10^3
Welch Prospect	...do...	43	2.0×10^1

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
No 5	Stanislaus	51	9.95×10^2
Lucky Girl Mine	...do...	42	1.5×10^2
Chrome Camp Mine	...do...	40	9.3×10^2
Black Bear Mine	...do...	50	3.42×10^2
Black Bart Group	...do...	35	4.14×10^2
Adobe Canyon Group	...do...	27	5.0×10^2
Black Chrome	Tehama	49	4.4×10^1
Blue Sky (Lucky Star)	...do...	47	4.52×10^2
Elder Creek	...do...	46	8.4×10^1
Elder Creek Group	...do...	45	3.53×10^3
Kleinsorge Group	...do...	46	1.64×10^3
Noble Electric Co.	...do...	47	1.8×10^3
State School	...do...	47	6.74×10^2
Bragdor	Trinity	46	1.0×10^2
Crow Creek Group	...do...	41	2.0×10^3
Happy Go Lucky	...do...	45	4.5×10^1
I Wonder	...do...	52	1.2×10^1
Mule Creek	...do...	44	3.3×10^1
Oak Ridge	...do...	49	1.7×10^1
Redskin	...do...	42	1.0×10^2
September Morn	...do...	48	6.4×10^1
Shamrock	...do...	43	5.0×10^1
Stark Bee	...do...	44	4.6×10^1
Sunnyslope	...do...	39	2.6×10^2
Yellow Pine	...do...	50	2.1×10^2
Tangle Blue Divide	...do...	45	9.7×10^1
Earl Smith	Tulare	39	2.55×10^2
Gill (Gill Ranch)	...do...	40	4.0×10^2
Holston (Vaughn)	...do...	47	3.33×10^3
Ace of Spades	Tuolumne	21	4.35×10^2
Booker Lease	...do...	36	4.3×10^1
Don Pedro	...do...	40	6.0×10^2
Eggling and Williams	...do...	38	3.63×10^2

Deposit name	Location (County)	Grade (Percent Cr_2O_3)	Tonnage (Metric tons)
Mc Cormick	Tuolumne	46	3.85×10^3
Mackay	...do...	37	4.15×10^2
Mum and Alice June claims	...do...	17	2.5×10^4
North End, West End and Spotted Fawn	...do...	38	3.5×10^3
Perconi Ranch Deposits	...do...	33	5.0×10^1
Quigg	...do...	35	1.70×10^3
Richards	...do...	23	8.45×10^3
Shafer lease	...do...	31	8.5×10^0
Sims	...do...	37	2.9×10^1
Sullivan and Kahl	...do...	31	8.5×10^2
Challenge Area	...do...	33	1.75×10^1
Camptonville Area	...do...	38	3.86×10^1

Porphyry Copper

Deposits were placed in the class if they included disseminated pyrite, chalcopyrite, and frequently molybdenite and bornite in or near felsic to intermediate intrusive rocks. Most deposits had at least one porphyry facies of intrusive. In most cases, deposits were placed in this class if they were called porphyries in the literature. Deposits from western Canada and Alaska were selected as the most appropriate model for Alaskan deposits because the average grades and tonnages of porphyry copper deposits tend to be lower for deposits located farther north along the trend of deposits from Chile, through the southwestern U.S., to British Columbia and Alaska. In spite of this precaution, the grades of the Canadian deposits appeared to be too high compared to those reported in preliminary drilling of the Alaskan deposits; the grade model used in the RAMRAP reports was therefore a result of a subjective adjustment of the observed distribution. Both grade models are presented in Table 12.

Table 2.--Porphyry Copper Deposits

Deposit name	Location[a/]	Copper grade (Percent)	Molybdenum grade (Percent)	Tonnage (Metric tons x 10^6)	Reference
Bell Copper	CNBC	0.48	0.006	100.	3
Morrison	CNBC	.42	.013	95.	3
Dorothy	CNBC	.25	.01	45.	5
Krain (Keystone)	CNBC	.45	.013	18.	1
Axe	CNBC	.45	.012	45.4	2
Ann (Gravel Mt.)	CNBC	.27	.003	43.4	2
Poison Mountain	CNBC	.33	.015	175.	3
Berg	CNBC	.40	.03	363.	2
Schaft Creek (Laird)	CNBC	.40	.023	330.	3
Paramount Mining	CNBC	.337	.028	90.7	1
Patton Hill (Casino)	CNYU	.37	.0234	162.	2
Highmount (Ide)	CNBC	.285	.031	136.	1
Bethlehem (all properties)	CNBC	.46	.013	900.	8
Brenda	CNBC	.18	.05	159.	3
Gilbraltor	CNBC	.37	.01	327.	3
Maggie	CNBC	.28	.031	180.	3
Huckleberry	CNBC	.401	.013	78.9	3
Lornex	CNBC	.41	.013	425.	3
Island Copper	CNBC	.52	.019	257.	3
Caribou	CNBC	.50	.025	37.	1
Bond Creek	USAK	.30	.019	500.	6
Orange Hill	USAK	.35	.02	320.	6
O K	CNBC	.30	.01	68.	3
Afton	CNBC	.90		71.	7
Granisle	CNBC	.43		85.	3
Ingerbell(+ Similkameen)	CNBC	.53		68.	4
Galore (Stikine)	CNBC	1.00		125.	1
Valley Copper	CNBC	.48		900.	2
Sam Goosly	CNBC	.33		40.	2
Redgroup	CNBC	.56		41.	1

Deposit name	Location[a/]	Copper grade (Percent)	Molybdenum grade (Percent)	Tonnage (Metric tons x 10^6)	Reference
Evening Star & Galaxy copper	CNBC	.58		5.4	1
June (Dease Lake)	CNBC	.389		30.	1
Primer	CNBC	.20		23.	5
Kwanika	CNBC	.20		36.	5
Big Onion	CNBC	.36		18.	5
Catface	CNBC	.47		200.	1
Lorraine	CNBC	.70		10.	3
Wheal Tamar (Ajax)	CNBC	.50		9.	1
Copper Mtn.	CNBC	.41		140.	9
Eagle	CNBC	.50	.009	272.	10
Gambier Is.	CNBC	.28		297.	11

a/ See Table 11 for location codes.

Porphyry Molybdenum

Deposits were classified in this group if molybdenite occurs as disseminated grains or stockworks of quartz veins and veinlets in fractured or brecciated, altered granitic intrusive rocks and the associated country rocks or if deposits were reported to be of the porphyry molybdenum type but no information on the geology was presented. Subsequent to the collection of these data and their use in the RAMRAP estimates, rapid developments have occurred in exploration for and knowledge about molybdenum deposits. Several deposits, such as Quartz Hill and Thompson Creek, are now known to be much larger than our original data showed. According to T. Theodore (personal communication, 1979), theoretical considerations resulting from recent research suggest that deposits in Colorado may be of a special type not likely to occur in Alaska. In Table 12, a revised grade-tonnage model that reflects the revised grade and tonnage estimates and the deletion of Colorado and New Mexico deposits, is presented.

Table 3.--Porphyry Molybdenum Deposits

Deposit name [a/]	Location [b/]	Molybdenum grade (Percent)	Tonnage (Metric tons x 10^6)	References
Climax*	USCO	0.20	800.	7
Henderson*	USCO	.297	342.	7
Questa*	USNM	.10	230	4
Quartz Hill	USAK	.081	1180.	1
Mt. Emmons*	USCO	.26	150.	10
Endako	CNBC	.86	240.	7
Boss Mountain	CNBC	.22	7.6	9
Alice (Lime Creek,BC Moly)	CNBC	.12	105.	11
Moly (Bell)	NCBC	.066	32.5	2
Adera-Ruby Creek (Adanac)	CNBC	.096	94.3	2
St. Elmo	CNBC	.20	0.07	2
Giant	CNBC	.169	0.98	2
Canam	CNBC	.033	1.93	2
Elk	CNBC	.139	1.93	2
Glacier Gulch	CNBC	.17	90.7	2
Sunshine Creek (combined)	CNBC	.098	8.47	2
Haskin Mountain	CNBC	.09	12.2	2
Carmi & Lake	CNBC	.09	36.3	2
Gem (Bailey, Meg)	CNBC	.16	27.2	2
Lucky Ship	CNBC	.084	17.8	2
Karen	CNBC	.16	54.4	2
Roundy Creek	CNBC	.084	7.2	3
Red Mountain	CNBC	.24	1.0	6
Red Bird	CNBC	.15	27.	6
Pitman (JB)	CNBC	.08	3.4	6
Ajax	CNBC	.073	145.	9
Storie Moly	CNBC	.072	45.	6
Thompson Creek	USID	.11	233.	9
Malmbjerg	grld	.15	120.	8
Cannivan G	USMT	.096	180.	8
Mt. Tolman	USWA	.063	816	5

a/ * Deposits not used in revised grade-tonnage model

b/ See Table 11 for location codes.

Skarn/Tactite Tungsten

Tungsten-bearing deposits were placed in this class if they occurred near the contact of limestone or dolomite with intrusive igneous rocks. The tactite minerals include garnet, epidote, and magnetite, and the tungsten occurs only as scheelite. A variety of data sources were used, including some company-confidential sources. Some of the deposits are listed without deposit names, localities, or sources in order to preserve the confidential nature of the data. The geographic distribution of the deposits is world-wide, but the unidentified deposits are located in the United States.

Table 4.--Skarn/Tactite Tungsten Deposits

Deposit name	Location[a/]	Tungsten grade (Percent W)	Tonnage (Metric tons x 10^3)	Reference
		0.79	201.	
		1.43	26.	
		.87	128.	
		.32	706.	
		.20	403.	
		.99	329.	
		.56	288.	
Mactung	CNNT	.71	27,000.	1, 2
Tempiute	USNV	.40	7,200.	11
A Tungsten deposit	VNZL	.50	1,180.	5
Quixaba	BRSL	.72	163.	5
Maykhura	URTD	.32	708.	5
King Island	AUTS	.43	4,770.	5
Jersey-Emerald	CNBC	.72	758.	5
Osgood Mountains	USNV	.40	1,360.	5
Starbright	USCA	1.40	9.9	5
Tyrny-Auz	URRS	.32	21,000.	5
Brejui	BRSL	.47	3,730.	8
		.29	916.	
Red Button	USMT	.87	158.	3
Iron Mountain	USNM	.87	3.2	10
San Dong	KORA	1.35	3,400.	7
Uludag	TRKY	.40	14,200.	9
		.50	13,000.	
Lost Creek	USMT	.12	2,300.	4
		.40	3,850.	
		.55	780.	
		.84	270.	
Cupric	USUT	.28	3.6	6

Deposit name	Location[a/]	Tungsten grade (Percent W)	Tonnage (Metric tons x 10^3)	Reference
Ysxjoberg	SWDN	.26	2,500.	12
Victory W	CNBC	.40	83.8	8

a/ See Table 11 for location codes.

Mercury

Deposits were selected for the RAMRAP mercury model on the basis of recommenations of geologists familiar with the mercury deposits of Alaska. For example, Sainsbury and MacKevett (1965) state: "The Alaskan deposits, therefore, may be expected to be roughly comparable to similar deposits in Nevada in general ways." Similarly, deposits from California were not selected for the model on the basis of informed recommendations. For mercury deposits, data on grades and tonnages is not generally reported, though the contained metal of the deposits is.

Data for this model were obtained through the efforts of M. Johnson and J. Peterson from the U.S. Geological Survey CRIB file (Peterson and others, 1977), and is available to the public through the G.E. timesharing system.

Table 5.--Mercury Deposits

(data source listed in references)

Deposit name	Location[a/]	Mercury content (Metric tons)
A & B	USNV	7.9
Alexander Mine	USOR	.21
Allen Mine	USNV	1.7
Allison Prospect	USOR	.10
Alpine Prospect	USNV	.034
Ames & Bancroft	USOR	.24
Amity	USOR	11.
Andies Property	USNV	120.
Angel Peak	USOR	1.2
Antelope	USNV	.14
Axelandle	USOR	210.
B & B	USNV	7.0
Baldwin	USNV	4.8
Barnes Butte	USOR	1.0
Barnum - McDonnell	USWA	940.
Beowaw	USNV	5.1
Berry Creek	USNV	.034
Betty Mine	USNV	3.9
Birthday Group	USNV	9.3
Black Butte	USOR	660.
Black Hawk	USNV	2.4
Black Lizard	USNV	.17
Blue Can	USNV	60.
Blue Ridge	USOR	9.3
Bonanza	USOR	1400.
Bonita	USOR	.24
Bretz	USOR	590.
Buckskin	USNV	.069
Buckskin Peak	USNV	110.
Buena Vista	USOR	.31

Deposit name	Location[a/]	Mercury content (Metric tons)
Bunker Hill	USNV	.34
Butte Quicksilver	USNV	34.5
Byram-Oscar	USOR	2.2
Cahill	USNV	40.
Cardinal	USNV	4.5
Castle Peak Mine	USNV	91.
Castle Rock Prospect	USNV	.034
Champion Mine	USOR	1.3
Chisholm	USOR	1.1
Cinnabar Hills	USNV	3.4
Cinnabar Mountain	USOR	1.3
Coleman	USNV	.34
Container Mine	USNV	2.8
Cordero	USNV	3600.
Costa	USNV	.10
Crawford	USNV	.034
Currier	USOR	.10
Drew Mine	USNV	140.
Dutch Flat Mine	USNV	16.
Eastern Star	USNV	1.7
Eldorado	USNV	43.
Elkhead Mine	USOR	3.6
F & L	USNV	.34
Fault Line	USNV	.21
Fern Mine	USID	1000.
Finger	USNV	.10
Fisher-Roy Mine	USWA	130.
Flower Group	USNV	1.7
Freckles	USNV	59.
Glass Buttes	USOR	3.2
Goldbanks Quicksilver	USNV	120.
Govenor Group	USNV	4.5
Gray Prospect	USOR	.24

Deposit name	Location[a/]	Mercury content (Metric tons)
Hapgood	USNV	3.4
Hardluck Property	USNV	1.4
Harvey	USNV	2.4
Hasbrouke Property	USNV	.38
Hermes	USID	920.
Hillside	USNV	5.5
Hith Mine	USNV	2.4
Horse Canyon	USNV	21.
Horse Heaven	USOR	390.
Horse Mountain	USNV	6.5
Horton Mine	USNV	17.
Hot group	USNV	7.3
Humboldt	USOR	.17
Idaho Almaden	USID	620.
Inman Mine	USNV	2.4
Jackpot Property	USNV	.14
Jimmie Ann	USOR	15.
Juniper Mine	USNV	110.
Juniper Hill Mine	USID	.069
Kiggins Mine	USOR	2.4
King George	USMV	11.
Lakeview Property	USNV	.069
Lark Group	USNV	1.7
Last Chance Prospect	USNV	.034
Little Linda	USNV	.59
Lost Steers Group	USNV	16.
Luckey Boy Mine	USUT	21.
Lytle - Lynch	USWA	.34
M & M	USNV	3.4
Mammoth	USNV	2.4
Mariposa Prospect	USNV	2.4
Maud S. Mine	USOR	.24
Maury Mountain Mine	USOR	27.

Deposit name	Location[a/]	Mercury content (Metric tons)
McAdoo	USNV	57.
McCoy	USNV	11.
McDermitt	USNV	15000.
Miller	USID	.034
Mina Development	USNV	95.
Mogul Group	USOR	1.0
Montgomery	USNV	17.
Moser	USNV	.069
Motherlode Mine	USOR	21.
Mount Tobin	USNV	51.
Mountain King	USOR	3.3
Nevada Cinnabar	USNV	220.
Nevada Sulfur	USNV	2.4
Neibuhr Prospect	USNV	1.4
Nisbet Mine	USOR	3.5
Nonpareil	USOR	24.
North Fork	USNV	.45
O.K. Prospect	USNV	.34
Old Timer Property	USNV	.069
Opalite Mine	USOR	430
Oronogo	USOR	.45
Pershing Mine	USNV	150.
Platner	USOR	1.6
Poinsetta Mine	USNV	.34
Probert Mine	USUT	3.4
Rabbit Hole	USOR	.034
Rat Hole	USNV	.17
Rattlesnake	USNV	.45
Red Bird Group	USNV	.034
Red Bird Mine	USNV	53.
Red Cloud Mine	USOR	2.2
Red Ore Mine	USNV	58.
Red Rock Mine	USNV	170.
Red Rose	USNV	1.0

Deposit name	Location[a/]	Mercury content (Metric tons)
Reward Property	USNV	19.
Rick Property	USNV	.069
Rimrock and Homestake	USNV	.69
Roba-Westfall	USOR	.41
Rosebud Prospect	USNV	.24
Round Mountain	USOR	.069
Roxana	USOR	.24
Royal Reward	USWA	.14
Sacramento Gold Mine	USUT	120.
San Pedro Group	USNV	5.3
Senator	USNV	4.8
Sheebar	USNV	1.7
Silver Cloud	USNV	34.
Starlight Mine	USNV	5.6
Steamboat Springs	USNV	1.0
Steens Mountain Mine	USOR	1.2
Stockton Property	USNV	.69
Stickland Butte	USOR	.34
Taylor Ranch	USOR	10.
Teapot Prospect	USNV	.14
Tiptop Prospect	USNV	3.4
Towner	USOR	6.2
Valentine	USID	.034
Van Ness	USNV	26.
Virginia Claims	USID	.34
Vulture	USNV	.34
Walker Mine	USNV	3.8
War Eagle	USOR	23.
Washington Hill	USNV	1.7
Watson	USOR	.034
White Peaks Group	USNV	35.
Whaley's	USNV	.69

Deposit name	Location[a/]	Mercury content (Metric tons)
Wildhorse	USNV	30.
Yellowcat	USNV	.69

a/ See Table 11 for location codes.

Intrusive Nickel Sulfide

The classification of nickel deposits (Naldrett, 1973) has changed rapidly in the last ten years as the result of new information about the geology of these deposits. Thus a set of three empirical criteria were used to obtain a set of data for the RAMRAP nickel deposit model. The criteria used to select data for the intrusive nickel sulfide model were: deposits from orogenic belts only were selected, deposits only with reported nickel and copper grades and an associated tonnage were selected, and deposits suspected of having extrusive ultrabasic host rocks were not selected.

Table 6.--Intrusive Nickel Sulfide Deposits

Deposit name	Location[a/]	Ni grade (Percent)	Cu grade (Percent)	Tonnage (Metric tons x 10^6)	Reference
Axis Lake	CNSK	.50	.28	3.4	2
Bird River	CNMN	.50	.40	.30	5,4
Carr Boyd	AUWA	1.41	.49	1.8	5
Giant Mascot	CNBC	.65	.30	5.7	5,4
Gordon Lake	CNON	.85	.29	1.7	5,4
Kelly Lake	CNQB	.67	.73	1.2	2
Kluane Lake	NCYU	2.04	1.42	.57	5,4
Lakemont	CNON	.60	.40	1.8	2
Limerick	CNON	.91	.25	1.8	5
Lorraine	CNQB	.60	1.60	.50	7
Lynn Lake	CNMN	1.22	.62	14.	7, 3
Macassa	CNON	.70	.25	3.5	2
Maskwa	CNMN	1.06	.34	1.3	5, 6
Midrim	CNQB	.46	.70	.39	2
Nembeiben Lake	CNSK	.36	.40	5.6	2
Norpax	CNON	.85	.35	1.7	4, 2
Pickle Crow	CNON	.20	1.70	12.	5, 6
Populus Lake	CNON	1.06	.54	6.3	7, 2, 4
Renzy Lake	CNQB	.70	.70	1.2	2
St. Fabien	CNQB	.37	1.08	1.2	2
St. Stephen	CNNB	.97	.52	2.3	7, 2
Temagami Mine	CNON	.47	1.04	.70	2
Zulapa	CNQB	.55	.48	1.5	2
Belleterre	CNQB	.67	.73	2.0	7
Canalask	CNYU	1.50	.04	.50	2
Juneau lake	CNON	.87	.59	2.0	2
Retty Lake	CNQB	.55	.95	1.4	2
Chance Lake	CNQB	.89	.66	.65	2
Gagnè	CNQB	.88	.44	.27	2

Deposit name	Location[a/]	Ni grade (Percent)	Cu grade (Percent)	Tonnage (Metric tons x 10^6)	Reference
Nicobi Lake	CNQB	.48	.25	1.6	2
Sudbury Shakespeare	CNON	.34	.40	2.7	2
McVittie - Graham	CNON	.63	.38	2.3	2
Renner Prospect	CNON	.29	.26	2.6	2
Nicopar	CNON	.44	.19	.34	2
Jacobus Prospect	CNON	.41	.42	.85	2
Diadem Prospect	CNON	.18	.50	.45	2
Cat Lake	CNMN	.24	.58	.59	2
Ivy Group	CNSK	.29	.08	3.9	2
E & L	CNBC	.80	.62	3.0	2
Cons Mogador	CNQB	.82	.68	.32	2
Dumont (Wendell)	CNQB	.68	.30	.06	2
R. M. Nickel	CNQB	.51	.74	.09	2
Mattagami Lake	CNQB	.39	.28	.50	2
Owens	CNON	.53	.27	.09	2
New Dominion	CNON	.90	.75	.04	2
Keevil, etc.	CNMN	.60	1.00	2.3	2
Ore Fault	CNMN	.48	.20	1.5	2
Montcalm Township	CNON	1.00	.35	2.7	2

a/ See Table 11 for location codes.

Vein Gold

The definition of what constitutes a deposit is perhaps most difficult for vein deposits. Often several mines operate in the same vein or a mine may operate in several veins. Thus, several mines may be combined to represent one deposit. As with mercury deposits, data on the contained metal of the deposits, rather than on the grades and tonnages, is generally reported.

Table 7.--Vein Gold Deposits

Deposit name	Location[a/]	Gold content (Metric tons)	Reference
Aurum Deposit	CNBC	11.	1
Artic Mine	CNYU	5.3	5
Big Missouri	CNBC	1.8	3
Bralorne-Pioneer	CNBC	120.	3
Brown McDade	CNYU	.61	1
SK #3 Vein	CNBC	.055	1
Cariboo Gold Quartz - Island Mtn.	CNBC	64.	3
Cariboo-McKinney	CNBC	2.55	3
Zeballos-Spud Valley-Privateer Mount Zeballos-Central Zeballos	CNBC	12.	4
Detonia	CNBC	1.2	3
Engineer	CNBC	.56	2
Granite Poorman	CNBC	2.0	3
Hi Do	CNBC	.62	1
Laforma	CNYU	1.84	1, 5
Le Roi-Centre Star-War Eagle	CNBC	84.	3
Lucky Seven	CNBC	.025	1
Mt. Nansen	CNYU	2.1	1
Polaris Taku	CNBC	7.2	3
Premier	CNBC	56.	3
Salmon Gold	CNBC	3.4	1
Sheep Creek-Gold Belt, Kootenay Bell-Reno	CNBC	23.	3
Arlington	CNBC	3.09	4
Erie Creek	CNBC	2.9	4
Roche Deboule Mine	CNBC	.13	4
Smith Nash	CNBC	3.3	1
Surf Inlet	CNBC	12.	3
Union Franklin	CNBC	1.71	2
Velvet	CNBC	.62	3
Venus Mine	CNYU	2.3	1

Deposit name	Location[a/]	Gold content (Metric tons)	References
Vidette	CNBC	1.2	1,3
Ymir	CNBC	3.4	3
Alaska Juneau	USAK	76.	4
Berness Bay	USAK	2.0	4
Early Bird Mine	CNBC	1.5	4
Fairview-Oliver	CNBC	.48	4
Nighthawk	USWA	1.4	4
Perseverance	USAK	13.	4
Republic	USWA	24.	4
Slate Creek	USWA	.83	4
Surf Point	CNBC	11.	4
Treadwell	USAK	95.	4
Wenatchee	USWA	5.4	4
Wingdam Mine	CNBC	1.5	4

a/ See Table 11 for location codes.

Mafic Volcanogenic Copper

Deposits were selected on the basis of the presence of massive and irregular sulfide bodies in or closely associated with mafic volcanic rocks in eugeosynclines. Sulfide minerals include pyrite, chalcopyrite, and, for many deposits, sphalerite. The mafic volcanic rocks generally present were basalt or other basic lavas; deposits having any associated felsic or intermediate volcanic rocks were excluded. A copper grade and associated tonnage were required in order for the deposit to be included in the data used.

Table 8.--Mafic Volcanogenic Copper Deposits

Deposits name	Location[a/]	Copper grade (Percent)	Zinc grade (Percent)	Tonnage (Metric tons x 10^5)	Reference
Besshi	JPAN	3.80		190.	1
Sazare	JPAN	2.30		1.6	1
Surigad Cu-Zn	PLPN	2.50	1.00	1.0	1
Surigad Cu	PLPN	1.40		228.	1
Mindanao	PLPN	4.10		4.37	1
Sankarapi	INDS	1.80		100.	1
Balabae Is.	PLPN	4.70		4.75	1
Slovinky	CZSL	.80		81.3	1
Skouries	CRCE	.70		222.	1
Caracassi	GRCE	.80	.60	19.4	1
Limogardi	GRCE	1.50		29.3	1
Kure	TRKY	2.10	.70	43.1	1
Asikoy-Kurewest	TRKY	1.90		16.	1
Gedak	TRKY	5.00		1.0	1
Apliki	CPRS	1.80	.60	16.5	1
Kalavassos	CPRS	1.50	.70	24.7	1
Kynousa	CPRS	2.30	3.40	5.15	1
Limnt	CPRS	1.40		59.8	1
Mauri Sykia	CPRS	2.00		3.5	1
Maurououni	CPRS	4.00	.40	150	1
Petka	CPRS	1.80	1.50	5.0	1
Skouriotissa	CPRS	2.30		66.8	1
Twin J-MT	CNBC	2.80	.86	2.3	1
Campbell Chibougamau	CNQB	3.00		134.	1
Perill Islm	CNQB	2.00		12.5	1
Chibougamau Explores	CNQB	.90		5.4	1
Outokiepu	FNLD	4.00	.80	200.	1
Ropklev	NRWG	2.60	5.00	2.34	1
Vignas	NRWG	3.20	3.50	8.44	1
Lokken	NRWG	2.60	9.80	183	1

Deposit name	Location[a/]	Copper grade (Percent)	Zinc grade (Percent)	Tonnage (Metric tons x 10^5)	Reference
Fordal	NRWG	2.80	1.20	88.2	1
Roroscu	NRWG	1.70	.07	67.	1
Killingdal	NRWG	1.80	.66	9.1	1
Gjersvik	NRWG	2.10		14.3	1
Tuerrejellet	NRWG	2.50	1.50	8.0	1
Stekenjokk	SWDN	1.60	3.50	320.	1
Sain Bell-Chessy	FRNC	5.0	6.00	400.	1

a/ See Table 11 for location codes.

Felsic to Intermediate Volcanogenic Sulfide

Deposits were classified in this group if they consisted of massive and irregular sulfide bodies in or closely associated with felsic to intermediate volcanic rocks in submarine flysch environments. The sulfide minerals consisted of chalcopyrite, pyrite or pyrrhotite, sphalerite, and/or galena. In order to be included in the data set, both a copper grade and associated tonnage had to have been reported. For some deposits gold and/or silver grades and associated tonnages were reported. Many of the reported tonnages associated with gold and silver grades were significantly lower than the tonnages associated with copper grades in the same deposits. It was assumed that for many deposits only a portion of the deposit had gold and silver grades high enough to be reported and that it would therefore be misleading to present these grades with the higher tonnages associated with the copper grades. Thus, for silver and gold only contained metal is reported. Six deposits from Newfoundland that, according to the information available, met the criteria for this deposit type have been identified by D. Cox (personal communication, 1979) as belonging to the mafic volcanogenic deposit type and are not used in the revised grade-tonnage model for felsic to intermediate volcanogenic deposits.

Table 9.--Felsic to Intermediate Volcanogenic Deposits

Deposit name[a]	Location[b]	Gold tonnage (Metric tons)	Silver tonnage (Metric tons)	Copper grade (Percent)	Zinc grade (Percent)	Lead grade (Percent)	Tonnage (Metric tons x 10^4)	References
Suffield Mine	CNQB	.50	70.	1.28	6.45	.60	100.	1
Solbec Mine	CNQB	.60	51.	1.39	4.80	.74	178.	1
Cupra Mine	CNQB	.503	36.7	3.77	3.70	1.20	99.4	1
No. 6 Mine	CNQB		799.	.45	5.63	2.25	1480.	1
No. 12 Mine-Anaconda	CNNB		1920.	.27	8.90	3.54	5090.	1
Anaconda Orebody	CNNB		165.	.20	7.43	3.03	182.	1
Heath Steele Orebody	CNNB	4.07	542.	1.10	7.10	2.90	775.	1
Captain Mines property	CNNB	.02	2.7	1.99			57.6	1
Nigadoo River	CNNB		171.	.34	2.80	3.00	139.	1
Big Hill	CNNB		109.	.14	1.20	.80	80.4	1
Banet Prospect	USME	2.5	6.5	1.75			38.5	1
Mindamar	USME		32.7	.66	5.90	1.35	83.3	1
York Harbor	CNNS			2.63	8.25		21.8	1
Rambler Mine Property*	CNNF	7.3	3.9	1.43	1.74		247.	1
Tilt Cove Cu Pyrites*	CNNF	9.8	11.5	1.47			1220.	1
Tilt Cove Chalco*	CNNF	6.8	4.5	5.50			151.	1
Betts Cove*	CNNF	1.2	3.5	10.00	2.00		13.	1
Whalesback*	CNNF			1.50			400.	1
Gull Pond-Gullbridge M.*	CNNF			1.47			367.	1
Avoca Cu	IRLD			1.14	1.12	.08	2050.	1
Vanze Mine	CNQB			5.20	3.71		20.	1
Morbrun Property	CNQB	4.5	53.4	.69	2.20		304.	1
Golden Manitou Mine	CNQB	6.0	204.	.97	3.20		921.	1
Zulaka Mine	CNQB			.48			169.	1
Normetal Mine	CNQB	4.32	405.	1.94	7.70		1090.	1
Kelly-Osmond Property	CNQB		28.3	.73	6.90		100.	1
Joutel Copper Mine	CNQB			2.05	1.30		160.	1
Orchan Mine	CNQB	1.3	106.	1.26	11.00		327.	1
New Hosco Mine	CNQB			2.64	.14		174.	1

Deposit name[a/]	Location[b/]	Gold tonnage (Metric tons)	Silver tonnage (Metric tons)	Copper grade (Percent)	Zinc grade (Percent)	Lead grade (Percent)	Tonnage (Metric tons x 10^4)	References
Norita Mine	CNQB			.64	7.30		80.	1
Garon Lake Property	CNQB			2.12			29.5	1
Besakoa	MLGS			.60			77.7	1
Saxbergst	SWDN			.90	4.50	3.00	200.	1
Garkenberg	SWDN			.30	5.20		1000.	1
Rakkejaur	SWDN	12.	450.	.20	2.60		1000.	1
Pyhasalmi	FNLD	.80	63.8	.85	2.80	.06	375.	1
Ely Mine	USVT			3.50			50.	1
Elizabeth Mine	USVT			1.80			639.	1
Huntingdon Mine	CNQB	.07		2.00			48.9	1
Harvey Hill Mine	CNQB			1.85			76.4	1
Quandt	CNSK			2.75	1.50		50.	1
Flin Flon Orebody	CNMN	119.	1700.	2.99	4.40		5690.	1
Mandy Mine	CNMN	.40	6.8	5.47	16.50		21.	1
Schist Lake	CNMN	6.9	16.8	5.58	6.60		91.2	1
Flexar	CNMN	.20	.9	4.11	.40		24.1	1
Sourdough Bay	CNSK			3.00			75.	1
Vamp Lake	CNSK	1.01	6.8	1.10	1.60		50.	1
Morton L-Dickson L	CNMN			2.53	3.20		57.7	1
Fox Lake	CNMN			1.74	2.35		122.	1
Willecho Property	CNON		97.1	.77	3.10	.01	243.	1
Kotia-Kamiskotia Mine	CNON			1.69	2.00		625.	1
Canadian Jamieson Pr.	CNON			2.90	4.80		51.9	1
Horne Mine	CNQB	257.		2.11			5900.	1
Waite Dufault Property	CNQB			1.50			25.2	1
West Wasa Property	CNQB			2.00			154.	1
Munaz Property	CNQB	11.2	74.9	1.17	2.40		308.	1
Lake Dufault Mines	CNQB	2.	118.	3.30	6.80		257.	1
Waite Amulet Mine	CNQB	11.2	354.	4.71	3.10		955.	1
Cerro Roja Orebody	SPAN	32.7	792.	.80			4860.	1
Santa Domingo	PORT			1.17			2150.	1
Aznal Collar	SPAN			2.20			500.	1

Deposit name[a/]	Location[b/]	Gold tonnage (Metric tons)	Silver tonnage (Metric tons)	Copper grade (Percent)	Zinc grade (Percent)	Lead grade (Percent)	Tonnage (Metric tons x 10^4)	References
Porvenir Cu	SPAN			10.00			2.	1
Zyuzelski	URRS			4.20			143.	1
Salair	URRS			.90	8.80	.90	1270.	1
Burraga	AUNW			3.70			50.3	1
Read Roseberry	AUTS	16.3	1840.	.95	20.00	6.00	1070.	1
Anyox Hidden Creek	CNBC	3.4	187.	1.28			2390.	1
Britannia Mine	CNBC	11.4	133.	.95	.16	.03	4420.	1
Iron Mt. Mine	USCA	7.0	520.	3.35	3.50		873.	1
Mammoth Mine	USCA	3.4	202.	3.95	4.60		309.	1
United Verde Ext. Mine	UZAZ	4.3	185.	9.23			389.	1
Iron King Mine	UZAZ	12.2	524.	1.73	6.65	2.30	500.	1
Macuchi Mine	ECDR	4.61	5.2	5.00			62.4	1
Aquire	CILE			2.00			340.	1
LaBallade Mine	NCLD			12.50			8.64	1
Meretrice Mine	NCLD			4.00	29.00	25.00	9.5	1
Herin	ITLY			2.50			15.	1
Fabriche	ITLY			5.00			3.0	1
Knappenstube	ASTR			1.50			1000.	1
Lahanos	TRKY			2.00			12.5	1
Israil	TRKY			2.55			25.8	1
Girlak-Gorele	TRKY			2.00			250.	1
Dzansul	URGR			3.00			360.	1
Tchorokh	URGR			4.50			50.	1
Myra-Falls Lynx	CNBC	10.9	623.	8.30	1.30		471.	1,2
Kidd Creek Mine	CNON		15600.	2.43	7.00	.20	15700.	1,2
White Lake	CNMN	.28	1.6	2.16	5.70	.40	44.1	1,2
Vendome	CNQB	1.23	57.1	.52	6.70	.30	112.	1,2
Geco Mine	CNON		1510.	1.94	3.90		4720.	1,2
Matsuki	JPAN			1.00	3.00	2.00	922.	2
Shansanai	JPAN			1.49	2.22	.56	1030.	2
Mattagami Mine	CNBQ	9.08	45.	.55	6.76		2670.	1,2

a/ *Deposits not used in revised grade-tonnage model.

b/ See Table 11 for location codes.

Copper Skarn

Deposits were classified as copper skarns if they included disseminated chalcopyrite and, in most cases, magnetite in skarns. Typically, the deposits occur in metasomatized limestones in contact with younger igneous rocks. Although many of the deposits have gold and silver grades reported, the reported values are in some cases inconsistent; therefore gold and silver grades are not provided here. It is possible that some of the values for individual deposits reported here may actually represent several deposits in a district. Three deposits used in the grade-tonnage model developed for the RAMRAP reports have been found to be duplicates and have been removed from this list; seven other deposits were added to the list.

Table 10.--Copper Skarn Deposits

Deposit name	Location a/	Grade (Percent)	Tonnage (metric tons x 10^4	Reference
Gaspe Copper-Murdochville	CNQB	1.08	91.4	2
Wexford Mines Prop.	CNBC	1.52	10.	2
Tasu-Wesfrob Mine Cu	CNBC	.66	15.2	2
Yreka	CNBC	3.60	.21	2
Benson Lake	CNBC	1.60	1.26	2
Kasaan Peninsula	USAK	2.13	1.89	2
Craigmont Cu	CNBC	1.84	27.9	2
Phoenix	CNBC	.80	2500.	2
Snowshow N. Phoenix	CNBC	1.05	60.	2
Meme Zone	HATI	1.70	207	2
Cassius Prop.	HATI	.65	700.	2
Cerro deCobte-Cundina Marca	CLBA	3.00	33.3	2
Cobriza	PERU	2.53	710.	2
Tintaya	PERU	3.00	700.	2
Chalcobamba	PERU	1.50	3500.	2
Kamaish Cu-Ag-Au	JPAN	3.93	10.	2
Agdrdo and Brosso	ITLY	1.70	640.	2
Traversella	ITLY	2.00	40	2
Sasca Montana-Neu. Moldova	RMNA	2.50	100.	2
Malko Trnova	BULG	1.76	196.	2
Kedabeg Cu	URAZ	3.50	170.	2
Loei-Chiengkarn Area Cu	THLD	.90	8000.	2
Mackey District	USID	5.37	46.9	2
Standzha District	BULG	1.75	1000.	2
Cornell	CNBC	3.30	4.08	2
Marble Bay	CNBC	2.39	28.5	1
Vananda	CNBC	1.43	6.35	1
Indian Chief	CNBC	1.59	142.6	3
Blue Grouse	CNBC	2.73	24.9	1

Deposit name	Location a/	Grade (Percent)	Tonnage (Metric tons x 10^4	Reference
Mother Lode	CNBC	.89	392	1
Sunset	CNBC	.83	18.	3
B.C.	CNBC	4.37	9.34	1
Emma	CNBC	.98	23.2	1
Oro Denoro	CNBC	1.00	118.2	3
Queen Victoria	CNBC	2.04	4.44	1
Carr Fork	USUT	1.84	5550.	5
Copper Canyon	USNV	.80	1590.	4
Johnson Camp	USAZ	.85	2000.	5
Marble Peak	USAZ	2.28	3610.	5
Pima-Mission	USAZ	.56	37800.	5
Miami East	USAZ	1.95	5000.	5
Pinos Altos	USNM	2.0	700.	5

a/ See Table 11 for location codes.

Table 11.--Location Codes

ASTR	Austria	KORA	Korea
AUNW	Australia, New South Wales	MLGS	Malegasy Republic
AUTS	" , Tasmania	NCLD	New Caledonia
AUWA	" , Western Australia	NRWG	Norway
BRSL	Brazil	PERU	Peru
BULG	Bulgaria	PLPN	Philippines
CILE	Chile	PORT	Portugal
CLBA	Colombia	RMNA	Rumania
CNBC	Canada, British Columbia	SPAN	Spain
CNMN	" , Manitoba	SWDN	Sweden
CNNB	" , New Brunswick	THLD	Thailand
CNNF	" , Newfoundland	TRKY	Turkey
CNNS	" , Nova Scotia	URAZ	U.S.S.R., Azerbaidzhan
CNNT	" , Northwest Territory	URGR	" , Georgia
CNON	" , Ontario	URRS	" , Russian Republic
CNQB	" , Quebec	URTD	" , Turkmenia
CNSK	" , Saskatchewan	USAK	U.S.A., Alaska
CNYU	" , Yukon	USAZ	" , Arizona
CPRS	Cyprus	USCA	" , California
CZSL	Czechoslovakia	USCO	" , Colorado
ECDR	Ecuador	USID	" , Idaho
FNLD	Finland	USME	" , Maine
FRNC	France	USMT	" , Montana
GRCE	Greece	USNM	" , New Mexico
GRLD	Greenland	USNV	" , Nevada
HATI	Haiti	USOR	" , Oregon
INDS	Indonesia	USUT	" , Utah
IRLD	Ireland	USVT	" , Vermont
ITLY	Italy	USWA	" , Washington
JPAN	Japan	VNZL	Venezuela

Table 12.--Grade and Tonnage Models

(metric units)

NS, not significant; *, significant at 5-percent level; **, significant at 1-percent level

Deposit Type	Variable (units)	Number of deposits used	Correlation Coefficients	90 percent of deposits have at least	50 percent of deposits have at least	10 percent of deposits have at least
Copper Skarn	Tonnage (millions of tons)	42		0.13	2.60	52.00
	Average copper grade (percent)	42	with tonnage = -0.49**	0.81	1.70	3.50
	Average gold grade locally significant but not determined					
Podiform Chromite	Tonnage of Cr_2O_3(tons)	268		6.40	83.00	1100.00
Porphyry Molybdenum	Tonnage (Millions of tons)	27		1.50	25.00	430.00
	Average molybdenum grade (percent Mo)	27	with tonnage = -0.31 NS	0.06	0.11	0.19
Porphyry Copper	Tonnage (millions of tons)	41		19.00	94.00	450.00
	Average copper grade (percent)	41	with tonnage = -0.09 NS	0.25	0.40	0.63
	Average copper grade for Alaska (percent)			0.10	0.25	0.55
	Average molybdenum grade (percent Mo)	41		0.00	0.01	0.03
Mafic Volcanogenic Massive Sulfide	Tonnage (millions of tons)	37		0.24	2.30	22.00
	Average copper grade (percent)	37	with tonnage = -0.13 NS	1.10	2.20	4.10
	Average zinc grade excluding deposits without reported grades (percent)	19	with tonnage = 0.03 NS	0.30	1.30	5.50
	Average gold grade locally significant but not determined					
Felsic and Intermediate Volcanogenic Massive Sulfide	Tonnage (millions of tons)	86		0.19	2.00	21.00
	Average copper grade (percent)	86	with tonnage = -0.38**	0.53	1.70	5.30
	Average zinc grade (percent) excluding deposits without reported grades	54	with tonnage = -0.16 NS	0.90	3.80	15.70
	Average lead grade excluding deposits without reported grades (percent)	23	with tonnage = -0.33 NS	0.07	0.72	7.90
	Tonnage contained gold excluding deposits without reported gold (tons)	35	with tonnage = 0.78**	0.26	3.20	39.00
	Tonnage contained silver excluding deposits without reported silver (tons)	41	with tonnage = 0.86**	10.00	120.00	1500.00
Nickel Sulfide in Small Intrusives	Tonnage (millions of tons)	48		0.23	1.20	5.90
	Average nickel grade (percent)	48	with tonnage = -0.03 NS	0.32	0.61	1.20
	Average copper grade (percent)	48	with tonnage = 0.03 NS with nickel grade = 0.04 NS	0.18	0.47	1.20
Mercury	Tonnage of contained mercury (tons)	165		0.09	3.10	120.00
Vein Gold	Tonnage of contained gold (tons)	43		0.29	3.30	38.00
Skarn/Tactite Tungsten	Tonnage (millions of tons)	31		0.024	0.63	17.00
	Average tungsten grade (percent W)	31	with tonnage = -0.34 NS	0.24	0.51	1.10

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