

RESULTS OF 1984 BUREAU OF MINES SITE SPECIFIC MINERAL INVESTIGATIONS
IN THE VALDEZ CREEK MINING DISTRICT, ALASKA

by Mark P. Meyer
Alaska Field Operations Center, Anchorage, Alaska

THIS PUBLICATION IS FOR REFERENCE ONLY AND
MUST NOT BE TAKEN FROM THE BUILDING

*****Open File Report 50-86

UNITED STATES DEPARTMENT OF THE INTERIOR

Donald P. Hodel, Secretary

BUREAU OF MINES

Robert C. Horton, Director

CONTENTS

	<u>Page</u>
Abstract.....	1
Introduction.....	1
Acknowledgments.....	1
Location and access.....	1
Physiographic setting.....	3
Land status.....	3
Mining history.....	3
Previous studies.....	5
Present investigation.....	6
Conclusions.....	6
References.....	7
Appendix -- Sample results from the Clearwater Mountain area in the Valdez Creek Mining District, Alaska.....	18

ILLUSTRATIONS

1. Location map of Valdez Creek Mining District, Alaska.....	2
2. Sample location map of Clearwater Mountains study area in the Valdez Creek Mining District, Alaska.....	4

TABLE

1. Mine production of Valdez Creek Mining District, Alaska through 1985.....	5
---	---

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
lb	pound
oz	ounce
ppm	parts per million
st	short ton
yd ³	cubic yard

RESULTS OF 1984 BUREAU OF MINES SITE SPECIFIC MINERAL INVESTIGATIONS IN THE VALDEZ CREEK MINING DISTRICT, ALASKA

by Mark P. Meyer^{1/}

ABSTRACT

During 1984, the Bureau of Mines conducted site specific mineral investigations in the Valdez Creek Mining District, Alaska. This study included a literature search and reconnaissance level field investigations. The literature search identified 243 mines, prospects, and occurrences within the Valdez Creek Mining District. During the field reconnaissance, 19 samples were collected from 5 deposits: Denali Copper Prospect, Valdez Creek Placer Mine, Black Creek Gold Mine, Windy Creek Placer Prospect, and Timberline Creek Gold Mines.

Based upon preliminary Bureau of Mines studies a four year mining district study is recommended in order to determine the mineral development potential of the Valdez Creek Mining District.

INTRODUCTION

During 1984, the Bureau of Mines (Bureau) conducted a literature search and reconnaissance level site specific studies of the mineralization occurring within three mining districts in South-central Alaska. These were the Yentna, Willow Creek, and Valdez Creek districts. This report contains a compilation of references available for the Valdez Creek Mining District, summarizes Bureau work completed in the district during 1984, and gives reasons why additional studies are warranted.

ACKNOWLEDGMENTS

The author wishes to acknowledge the cooperation of the following miners in the Valdez Creek Mining District for allowing Bureau personnel to visit their mine sites: Leo Mark Anthony, Denali Copper Prospect; Lightfoot Mining Company, Black Creek; and Denali Mining Company, Valdez Creek.

LOCATION AND ACCESS

The Valdez Creek Mining District encompasses the area drained by the Susitna River above the mouth of the Talkeetna River and the area drained by the Chulitna River and its tributaries (fig. 1). The area comprises approximately 6 million acres. Road access is provided by

^{1/}Physical Scientist, Alaska Field Operations Center, Anchorage, Alaska.

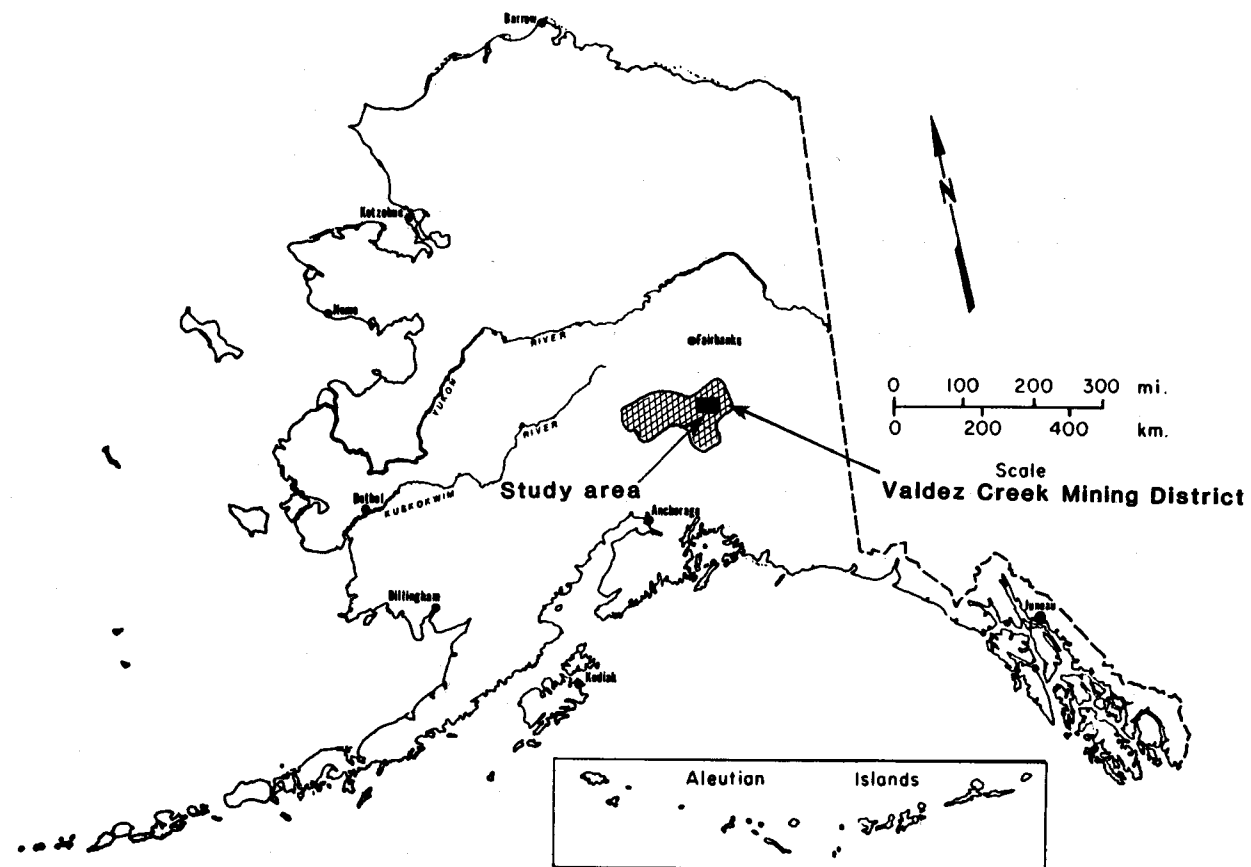


FIGURE 1. -- Location map of Valdez Creek Mining District, Alaska

the Parks, Richardson, and Denali Highways. Much of the district is accessible only by aircraft. The Clearwater Mountain area is in the northeastern portion of the district and includes the Valdez Creek and Windy Creek drainages (fig. 2). Access to these drainages is provided by poorly maintained mining roads which can be traversed by 4-wheel drive vehicles during drier portions of the summer season.

PHYSIOGRAPHIC SETTING

The Valdez Creek Mining District is within six Physiographic Provinces: (1) the Central and Eastern Part of the Alaska Range; (2) the Broad Pass Depression; (3) the Talkeetna Mountains; (4) the Clearwater Mountains; (5) the Gulkana Upland; and (6) the Copper Mountain Lowland (190)^{2/}. The area ranges from a broad glaciated

^{2/}Underlined numbers in parentheses refer to items in reference section at end of this report.

lowland with rolling morainal topography and outwash plains to rugged glaciated ridges up to 8,000 ft in elevation. Vegetation includes extensive stands of spruce, willow, and alder in the lowlying areas; stands of spruce and alders, and ground cover of tundra vegetation on the hillslopes; stunted spruce, lichen, and dwarf alpine vegetation on the rounded ridge crests; and lichen covered rocks on the ridges and peaks.

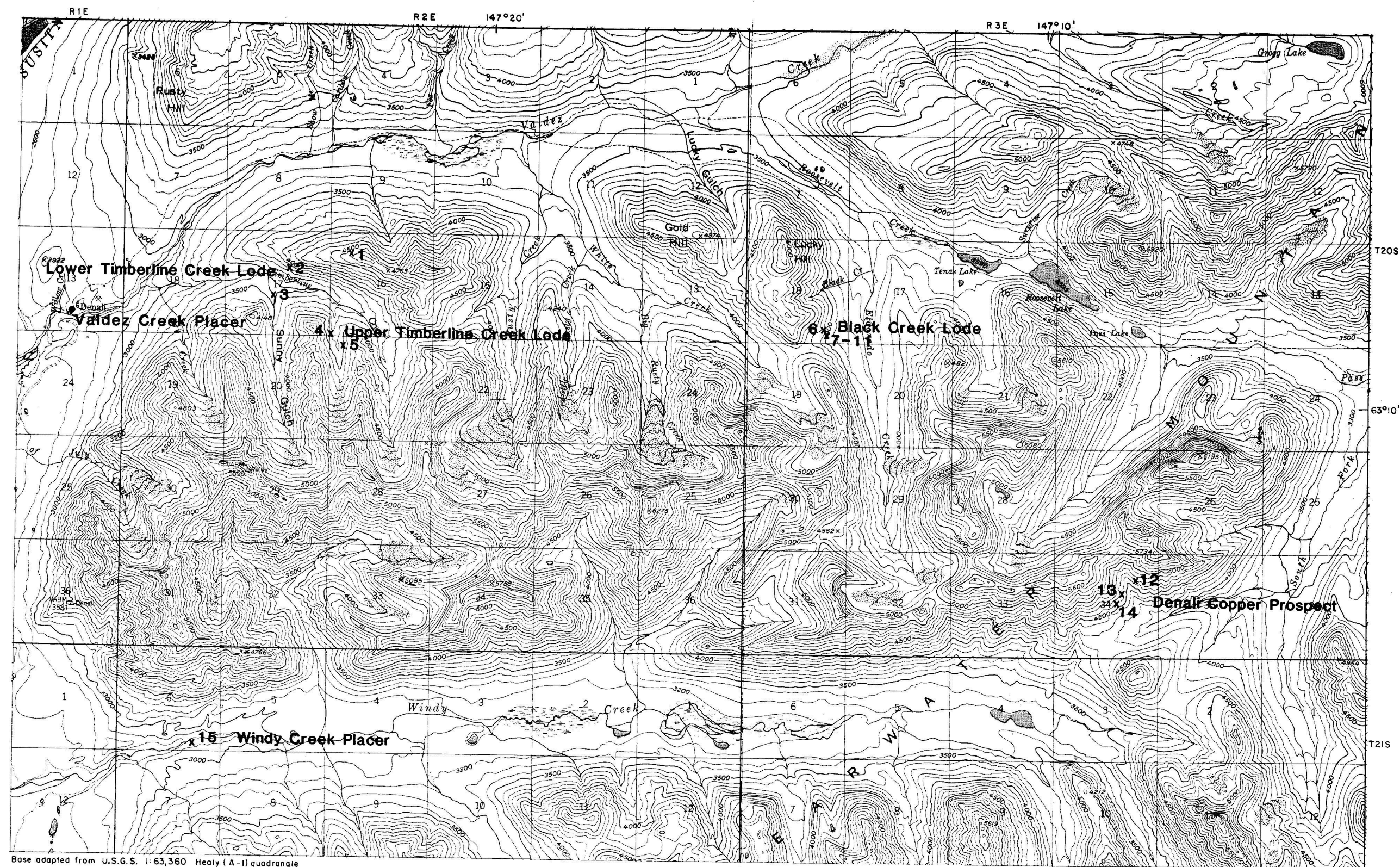
LAND STATUS

The Valdez Creek Mining District contains Federal, State, and private lands. The majority of the district is managed by the Bureau of Land Management (BLM). To determine current land status the Master Title Plats (MTP) can be reviewed at the BLM state office located in the Federal Building in Anchorage, Alaska.

MINING HISTORY

The first mineral discovery in the Valdez Creek Mining District occurred on August 15, 1903, when the Monahan Party discovered placer gold in the gravel deposits on Valdez Creek in the Clearwater Mountains (6). This discovery sparked an influx of prospectors to the area during the next several years. Valdez Creek has been the largest placer gold producer in the district (table 1). Several lode gold deposits in the Valdez Creek area, including the Timberline and Black Creek lodes, were discovered around 1906.

Mineral deposits in the Chulitna River area which is in the western portion of the district, were first discovered in 1907 with the discovery of placer gold (131). Lode copper deposits were discovered in the same area in 1911. The Golden Zone Mine was the sole metal



0 1 2
Scale, miles
Contour interval 100 feet

LEGEND

- x15 Sample site
- Grab sample site

FIGURE 2. -- Sample location map of Clearwater Mountains study area in the Valdez Creek Mining District, Alaska

producer (table 1), with several other prospects undergoing development work shortly after their discoveries. The Dunkle Coal Mine produced a limited quantity of coal between 1940 and 1954 (table 1).

Lode copper deposits in the Maclaren River area, in the eastern portion of the district, were first discovered in 1918. None of the deposits have had recorded production, though several deposits have undergone significant development work.

Placer mining activity occurred during 1984 and 1985 on Valdez Creek (Denali Mining Co.) and several of its tributaries. Lode gold mining occurred on Black Creek in 1984. Recent development work has taken place at the Denali Copper Prospect.

TABLE 1. - Mine production of Valdez Creek Mining District, Alaska through 1985

Mine	Gold (troy oz)	Silver (oz)	Copper (lbs)	Lead (lbs)	Coal (tons)
Valdez Creek placer.	104,617	NP	NA	NA	NA (1903-1985)
White Creek placer..	484	NP	NA	NA	NA (up to 1931)
Canyon Creek placer.	9	1	NA	NA	NA (up to 1920)
Golden Zone Mine....	1,581	8,617	40,648	2,976	NA (1911-1942)
Dunkle Mine.....	NA	NA	NA	NA	64,000 (1940-1954)
Total	106,691	8,617	40,648	2,976	64,000

NP No production records

NA Not applicable

PREVIOUS STUDIES

Numerous mineral studies have been conducted in the Valdez Creek Mining District by the U.S. Geological Survey (USGS), State of Alaska Territorial Department of Mines (TDM) and Division of Geological and Geophysical Surveys (DGGS), Bureau, private companies, and by graduate students.

The USGS first reported on the district as early as 1908 by Brooks (6). Since that time, Brooks (7-20), Capps (22-25), Cobb (33-44), Hawley (64-71), Moffit (109-114), Smith (147-163), Tuck (183-184), and many other authors have written reports. Alaska Mineral Resource Assessment Program (AMRAP) studies were published on the Talkeetna Mountains Quadrangle in 1978 (50-55, 116, 121-123, 176, 182), and on the Talkeetna Quadrangle in 1979 (46-49, 86, 97-108, 177).

The TDM began writing reports on the area as early as 1918 including those by Jasper (76-80), Joesting (81-83), and others (2, 56, 74, 91, 136-140, 144-145, 180, 191, 197). The DGGS began writing reports in 1964 by Kaufman (87) and later by Bundtzen (21), and others (57, 59, 127, 129-130, 141, 167-174, 179, 185).

The Bureau has written site specific reports including those by Rutledge (133-134), Wells (195), and Mulligan (115).

Several private reports have been written on the area by Renshaw (125-126), Thurow (181), and Salisbury and Dietz (135).

M.S. and Ph.D. dissertations have been written by Glavinovich (60) and Stevens (178).

PRESENT INVESTIGATION

From a detailed literature search, 243 mines, prospects, and occurrences were identified in the Valdez Creek Mining District. Of these, only 5 mines have had recorded production (table 1). During a 5 day field reconnaissance, 19 samples were collected from four lode mines and two placer deposits in the Clearwater Mountains area (fig. 2). The lode mines were the Denali Copper Prospect, Upper Timberline Creek, Lower Timberline Creek, and Black Creek Mine. The placer deposits were the Valdez Creek Mine and Windy Creek placer. Results for 15 of the samples are listed in the appendix. A grab sample taken from the Valdez Creek Placer Mine was processed at the Bureau's lab in Anchorage.

Samples collected from the Denali Copper prospect contained from 180 to 56,000 ppm copper, 15 to 25 ppm lead, 20 to 265 ppm zinc, 430 to 4,400 ppm manganese, and 750 to 3,400 ppm titanium. Upper Timberline Creek contained from 0.078 to 0.822 oz/st gold, 0.04 to 0.41 oz/st silver, 255 to 800 ppm copper, and 500 to 800 ppm arsenic. Lower Timberline Creek contained from 0.107 to 0.820 oz/st gold, 0.07 to 0.68 oz/st silver, 75 to 135 ppm copper, and 15 to 800 ppm lead. Black Creek lode contained from <0.003 to 0.169 oz/st gold, <0.01 to 0.33 oz/st silver, 50 to 750 ppm arsenic, 25 to 65 ppm copper, and 15 to 80 ppm lead.

Windy Creek placer contained 0.0027 oz/yd³ gold. A grab sample taken from the paystreak at the Valdez Creek Mine contained 0.3421 oz/yd³ gold. The gold in the sample ranges from -6 to +60 mesh in size and has a flat or round character.

CONCLUSIONS

On the basis of available literature and a reconnaissance level site specific field investigation, it can be suggested that three significant areas of mineralization are included in the Valdez Creek Mining District. These areas are the Chulitna River-Broad Pass area, Clearwater Mountains area, and the Maclaren River-Glacier area.

Although a large number of references are available for the Valdez Creek Mining District, very little site specific work relating to mineral development potential has been completed. Most work of this nature was done without the benefit of modern exploration and mineral resource appraisal techniques.

Several operating placer mines and one active lode gold mine are present in the Clearwater Mountains. Several additional deposits are being developed.

These activities, previous mining history, lack of modern mineral data, and encouraging results provided by 1984 Bureau sampling suggest that the Valdez Creek Mining District has significant mineral development potential. Additional work is recommended to determine ore reserves, study beneficiation technologies, conduct economic feasibility studies, and address the economic, infrastructure, and legislative effects on mineral development in the Valdez Creek Mining District.

REFERENCES

1. Andreasen, G. E., A. Grantz, I. Zietz, and D. F. Barnes. Geologic Interpretation of Magnetic and Gravity Data in the Copper River Basin, Alaska. U.S. Geol. Surv. Prof. Paper 316-H, 1964, pp. 135-153.
2. Apell, G. A. Broad Pass Coal Report. Territory of AK, Dept. of Mines MR 67-4, 1944.
3. Armstrong, A. K., B. L. Reed, and C. Carter. Paleozoic Sediments in the Northwest Part of the Talkeetna Quadrangle, Alaska Range, Alaska. U.S. Geol. Surv. Circ. 751-B, 1977, 61 pp.
4. Barnes, F. F., C. Wahrhaftig, C. A. Hickcox, J. Freeman, and D. M. Hopkins. Coal Investigations in South-Central Alaska, 1944-46. U.S. Geol. Surv. Bull. 963-E, 1951, pp. 137-213.
5. Berg, H. C., and E. H. Cobb. Metalliferous Lode Deposits of Alaska. U.S. Geol. Surv. Bull. 1246, 1967, 254 pp.
6. Brooks, A. H. The Mining Industry in 1907. U.S. Geol. Surv. Bull. 345, 1908, pp. 30-53.
7. -----. The Mining Industry in 1908. U.S. Geol. Surv. Bull. 379, 1909, pp. 21-62.
8. -----. The Mining Industry in 1909. U.S. Geol. Surv. Bull. 442, 1910, pp. 20-46.
9. -----. The Mining Industry in 1910. U.S. Geol. Surv. Bull. 480, 1911, pp. 15-20.
10. -----. The Mount McKinley Region, Alaska. U.S. Geol. Surv. Prof. Paper 70, 1911, 234 pp.
11. -----. The Mining Industry in 1912. U.S. Geol. Surv. Bull. 542, 1913, pp. 18-51.
12. -----. The Alaskan Mining Industry in 1913. U.S. Geol. Surv. Bull. 592, 1914, pp. 45-74.
13. -----. The Alaskan Mining Industry in 1914. U.S. Geol. Surv. Bull. 622-A, 1915, pp. 15-68.
14. -----. The Alaskan Mining Industry in 1915. U.S. Geol. Surv. Bull. 642, 1916, pp. 16-72.
15. -----. The Alaskan Mining Industry in 1916. U.S. Geol. Surv. Bull. 662, 1918, pp. 11-62.
16. -----. The Alaskan Mining Industry in 1920. U.S. Geol. Surv. Bull. 722-A, 1921, 74 pp.
17. -----. The Alaskan Mining Industry in 1921. U.S. Geol. Surv. Bull. 739-A, 1922, 50 pp.
18. -----. Alaska's Mineral Resources and Production, 1923. U.S. Geol. Surv. Bull. 773, 1925, pp. 3-52.
19. Brooks, A. H., and S. R. Capps. The Alaskan Mining Industry in 1922. U.S. Geol. Surv. Bull. 755-A, 1923, 56 pp.
20. Brooks, A. H., and G. C. Martin. The Alaskan Mining Industry in 1919. U.S. Geol. Surv. Bull. 714, 1921, pp. 59-96.
21. Bundtzen, T. K., G. R. Eakins, J. G. Clough, L. L. Lueck, C. B. Green, M. S. Robinson, and D. A. Coleman. Alaska's Mineral Industry 1983. AK. Div. of Geol. and Geophysical Surv. Spec. Rep. 33, 1984, 56 pp.
22. Capps, S. R. Mineral Resources of the Upper Chulitna Region. U.S. Geol. Surv. Bull. 692, 1919, pp. 207-232.

23. Capps, S. R. Geology and Mineral Resources of the Region Traversed by the Alaska Railroad. U.S. Geol. Surv. Bull. 755-C, 1924, pp. 73-150.
24. -----. Geology of the Alaska Railroad Region. U.S. Geol. Surv. Bull. 907, 1940, 201 pp.
25. Capps, S. R., and M. N. Short. A Ruby Silver Prospect in Alaska. U.S. Geol. Surv. Bull. 783, 1926, pp. 89-95.
26. Carnes, R. D. Active Alaskan Placer Operations, 1975. BuMines OFR 98-76, 1976, 83 pp.
27. Chapin, T. Auriferous Gravels of the Nelchina-Susitna Region. U.S. Geol. Surv. Bull. 622, 1915, pp. 118-130.
28. -----. The Nelchina-Susitna Region, Alaska. U.S. Geol. Surv. Bull. 668, 1918, 67 pp.
29. Chapman, R. M., and R. H. Saunders. The Kathleen-Margaret (K-M) Copper Prospect on the Upper Maclaren River, Alaska. U.S. Geol. Surv. Circ. 332, 1954, 5 pp.
30. Clark, A. L., and E. H. Cobb. Metallic Mineral Resources Map of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 369, 1972.
31. -----. Metallic Mineral Resources of the Healy Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 394, 1972.
32. Clark, A. L., and C. C. Hawley. Reconnaissance Geology, Mineral Occurrences, and Geochemical Anomalies of the Yentna District, Alaska. U.S. Geol. Surv. OFR 311, 1968, 64 pp.
33. Cobb, E. H. Metallic Mineral Resources Map of the Mount McKinley Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 366, 1972.
34. -----. Metallic Mineral Resources Map of the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 370, 1972.
35. -----. Metallic Mineral Resources Map of the Mount Hayes Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 414, 1972.
36. -----. Metallic Mineral Resources Map of the Gulkana Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 419, 1972.
37. -----. Placer Deposits of Alaska. U.S. Geol. Surv. OFR 508, 1972, 132 pp.
38. -----. Index of Metallic Mineral Deposits of Alaska Compiled from Reports in Open Files of the U.S. Geological Survey and U.S. Bureau of Mines Through 1972. U.S. Geol. Surv. OFR 564, 1973, 87 pp.
39. -----. Placer Deposits of Alaska. U.S. Geol. Surv. Bull. 1374, 1973, pp. 14-15, 18-19.
40. -----. Summary of References to Mineral Occurrences (other than Mineral Fuels and Construction Materials) in the Mount Hayes Quadrangle, Alaska. U.S. Geol. Surv. OFR 79-238, 1979, 140 pp.
41. -----. Alaskan Papers and Abstracts Published by the Geological Society of America, 1890-1978, Indexed by Quadrangle. U.S. Geol. Surv. OFR 79-1640, 1979, 201 pp.
42. Cobb, E. H., and B. Csejtey, Jr. Summaries of Data on and Lists of References to Metallic and Selected Nonmetallic Mineral Deposits in the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 80-716, 1980, 63 pp.

43. Cobb, E. H., and R. Kachadoorian. Index of Metallic and Nonmetallic Mineral Deposits of Alaska, Compiled from Published Reports of Federal and State Agencies Through 1959. U.S. Geol. Surv. Bull. 1139, 1961, 363 pp.
44. Cobb, E. H., and B. L. Reed. Summaries of Data on and Lists of References to Metallic and Selected Nonmetallic Mineral Deposits in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. OFR 80-884, 1980, 160 pp.
45. Coonrad, W. L., and R. L. Elliott. The United States Geological Survey in Alaska: Accomplishments During 1981. U.S. Geol. Surv. Circ. 868, 1984, pp. 70-109.
46. Csejtey, B. Jr., and A. Griscom. Preliminary Aeromagnetic Interpretive Map of the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-C, 1978, 14 pp.
47. Csejtey, B. Jr., and R. J. Miller. Table Describing Metalliferous and Selected Nonmetalliferous Mineral Deposits in the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-B, 1978, 20 pp.
48. Csejtey, B. Jr., W. J. Nelson, D. L. Jones, N. J. Siberling, R. M. Dean, M. S. Morris, M. A. Lanphere, J. G. Smith, and M. L. Silberman. Reconnaissance Geologic Map and Geochronology, Talkeetna Mountains Quadrangle, Northern Part of Anchorage Quadrangle, and Southwest Corner of Healy Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-A, 1978, 60 pp.
49. Curtin, G. C., E. F. Cooley, R. M. O'Leary, and S. K. McDanal. Spectrographic and Chemical Analysis of Bulk Heavy-Mineral Concentrate Samples from the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-146, 1978, 26 pp.
50. Curtin, G. C., R. C. Karlson, G. W. Day, R. M. O'Leary, and R. B. Tripp. Geochemical Maps Showing Distribution and Abundance of Selected Elements in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-301, 1978.
51. Curtin, G. C., R. C. Karlson, R. M. O'Leary, G. W. Day, and S. K. McDanal. Geochemical Maps Showing the Distribution and Abundance of Gold and Silver in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-E, 1978.
52. Curtin, G. C., R. C. Karlson, R. M. O'Leary, G. W. Day, and C. M. McDougal. Geochemical Maps Showing the Distribution and Abundance of Copper, Lead, Zinc, and Molybdenum in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-G, 1978.
53. Curtin, G. C., R. C. Karlson, R. B. Tripp, and G. W. Day. Geochemical Map Showing the Distribution and Abundance of Tin, Tungsten, and Beryllium in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-F, 1978.
54. Curtin, G. C., R. M. O'Leary, R. B. Tripp, and E. F. Cooley. Geochemical and Generalized Geologic Maps Showing the Distribution and Abundance of Thorium, and the Distribution of Uranium in Selected Samples, in the Central Alaska Range, Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. OFR 79-430, 1979.
55. Curtin, G. C., R. C. Tripp, G. W. Day, E. F. Cooley, and C. M. McDougal. Geochemical Maps Showing the Distribution and Abundance of Chromium and Nickel in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-H, 1978.

56. Dunkle, W. E. Golden Zone Mine, Inc. Territory of AK, Dept. of Mines MR 67-6, 1938-1947.
57. Eakins, G. R., T. K. Bundtzen, M. S. Robinson, J. G. Clough, C. B. Green, K. H. Clautice, and M. A. Albanese. Alaska's Mineral Industry 1982. AK. Div. of Geol. and Geophysical Surv. Spec. Rep. 31, 1983, 63 pp.
58. Eldridge, G. H. A Reconnaissance in the Susitna Basin and Adjacent Territory, Alaska in 1898. U.S. Geol. Surv. 20th Annu. Rep. pt. 7, 1900, pp. 1-29.
59. Gilbert, W. G., and J. T. Kline. Preliminary Geochemistry of Stream-Sediment Samples, Western Healy D-1 Quadrangle and Vicinity, Alaska. AK. Div. of Geol. and Geophysical Surv. AOF-97, 1976.
60. Glavinovich, P. S. Trace Element Copper Distribution and Areal Geology in a Portion of the Clearwater Mountains, Alaska. M.S. Thesis, Univ. of AK. Fairbanks, College, AK. Mineral Industry Research Laboratory Rep. 10, 1967, 55 pp.
61. Griscom, A. Aeromagnetic Map and Interpretation of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-B, 1978.
62. Harris, M. Cook Inlet Holds Promise of New Alaska Gold Bonanza. AK. Construction and Oil, v. 25, No. 7, 1984, pp. 28-34.
63. -----. Mining Industry Poised to Bolster State Economy - But Waiting for Market Turnaround. AK. Construction and Oil, v. 25, No. 7, 1984, pp. 14-16.
64. Hawley, C. C. Mineral Belts and Districts, Prospective Regions, and Land Status in Alaska. C. C. Hawley and Associates, Anchorage, AK, 1973, 26 pp.
65. Hawley, C. C., and Associates. Mineral Appraisal of Lands Adjacent to Mt. McKinley National Park, Alaska. BuMines OFR 24-78 (Contract No. J0166107), 1978, 275 pp.
66. Hawley, C. C., and A. L. Clark. Occurrences of Gold and Other Metals in the Upper Chulitna District, Alaska. U.S. Geol. Surv. Circ. 564, 1968, 21 pp.
67. -----. Geology and Mineral Deposits of the Chulitna-Yentna Mineral Belt, Alaska. U.S. Geol. Surv. Prof. Paper 758-A, 1973, 10 pp.
68. -----. Geology and Mineral Deposits of the Upper Chulitna District, Alaska. U.S. Geol. Surv. Prof. Paper 758-B, 1974, 47 pp.
69. Hawley, C. C., A. L. Clark, and J. A. Benfer. Geology of the Golden Zone Mine Area, Alaska. U.S. Geol. Surv. OFR 305, 1968, 16 pp.
70. Hawley, C. C., A. L. Clark, M. A. Herdrick, and S. H. B. Clark. Results of Geological and Geochemical Investigations in an Area Northwest of the Chulitna River, Central Alaska Range. U.S. Geol. Surv. Circ. 617, 1969, 19 pp.
71. Hawley, C. C., A. L. Meier, and R. L. Miller. Geochemical Investigation at Antimony Creek Antimony Prospect, Northern Talkeetna Mountains, Alaska. U.S. Geol. Surv. OFR 337, 1968, 8 pp.
72. Hickman, R. G., and C. Craddock. Mineral Occurrences Near Cantwell, South-Central Alaska. AK. Div. of Geol. and Geophysical Surv. Spec. Rep. 13, 1976, 7 pp.
73. -----. Geologic Map of West-Central Healy Quadrangle, Alaska. AK. Div. of Geol. and Geophysical Surv. AOF-95, 1976.
74. Holdsworth, P. R. Ihly-Callahan-Pauky Silver Lead Prospect. Territory of AK, Dept. of Mines PE 76-1, 1952.

75. Huber, D. W., and J. R. Scott. Coal Mining in Alaska. (Proc. Conf. AK. A.I.M.E., Univ. of AK, College, AK, March 1964). Territory of AK, Dept. of Mines MR 195-36, 1964, 11 pp.
76. Jasper, M. J. Itinerary Report - Little Susitna River Drainage Area. Territory of AK, Dept. of Mines IR 1954, 1954, 3 pp.
77. -----. Itinerary Report - Copper River Region. Territory of AK, Dept. of Mines IR 1956, 1956, 5 pp.
78. -----. Itinerary Report - Little Susitna Area. Territory of AK, Dept. of Mines IR 1956, 1956, 5 pp.
79. -----. Itinerary Report - Seward Highway. Territory of AK, Dept. of Mines IR 1956, 1956, 5 pp.
80. -----. Resume' of 1963 Field Investigations and Mining Activity in Third and Section of Fourth Judicial Districts. Territory of AK, Dept. of Mines IR 1963, 1963, 16 pp.
81. Joesting, H. R. Geology and Ore Deposits on Ptarmigan Creek (Molybdenite). Territory of AK, Dept. of Mines PE 68-1, 1941.
82. -----. Strategic Mineral Occurrences in Interior Alaska. Territory of AK, Dept. of Mines Pamphlet No. 1, 1942, 46 pp.
83. -----. Supplement to Pamphlet No. 1 - Strategic Mineral Occurrences in Interior Alaska. Territory of AK, Dept. of Mines Pamphlet No. 2, 1943, 28 pp.
84. Kachadoorian, R., D. M. Hopkins, and D. R. Nichols. A Preliminary Report of Geologic Factors Affecting Highway Construction in the Area Between the Susitna-Maclaren Rivers, Alaska. U.S. Geol. Surv. OFR 92, 1953, 73 pp.
85. Kachadoorian, R., and T. L. Pewe. Engineering Geology of the Southern Half of the Mt. Hayes A-5 Quadrangle, Alaska. U.S. Geol. Surv. OFR 110, 1955, 27 pp.
86. Karlson, R. C., G. C. Curtin, E. F. Cooley, and L. Garnezy. Geochemical Maps of Selected Elements and Results of Spectrographic Analysis for Heavy-Mineral Concentrates from the Western Half of the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 77-530, 1977, 32 pp.
87. Kaufman, M. A. Geology and Mineral Deposits of the Denali-Maclaren River Area, Alaska. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. No. 4, 1964, 15 pp.
88. Koschmann, A. H., and M. H. Bergendahl. Principal Gold-Producing Districts of the United States. U.S. Geol. Surv. Prof. Paper 610, 1968, 283 pp.
89. MacKevett, E. M., Jr. Ore Controls at the Kathleen-Margaret (Maclaren River) Copper Deposit, Alaska. Ch. in Geological Survey Research 1964. U.S. Geol. Surv. Prof. Paper 501-C, 1964, pp. C117-C120.
90. MacKevett, E. M., Jr., and C. D. Holloway. Table Describing Metalliferous and Selected Nonmetalliferous Mineral Deposits in Eastern Southern Alaska. U.S. Geol. Surv. OFR 77-169-A, 1977, 99 pp.
91. Malone, K. Yearly Mineral Industry Survey, Summary Report of the Mining Survey Team for Alaska. Prepared by the Overseas Mineral Resources Development Cooperation Association. Territory of AK, Dept. of Mines MR 195-35, 1962.
92. Martin, G. C. The Alaskan Mining Industry in 1917. U.S. Geol. Surv. Bull. 692, 1919, pp. 11-42.
93. -----. The Alaskan Mining Industry in 1918. U.S. Geol. Surv. Bull. 712, 1920, pp. 11-52.

94. Matzko, J. J., and V. L. Freeman. Summary of Reconnaissance for Uranium in Alaska, 1955. U.S. Geol. Surv. Bull. 1155, 1963, pp. 33-49.
95. Mendenhall, W. C. Geology of the Central Copper River Region, Alaska. U.S. Geol. Surv. Prof. Paper 41, 1905, 133 pp.
96. Mertie, J. B., Jr. Platinum-Bearing Gold Placers of the Kahiltna Valley. U.S. Geol. Surv. Bull. 692, 1919, pp. 233-265.
97. Miller, R. J., G. C. Curtin, and B. Csejtey, Jr. Map Showing Geochemical Distribution and Abundance of Tin in Stream Sediments and Heavy-Mineral Concentrations, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-E, 1978.
98. -----. Map Showing Geochemical Distribution and Abundance of Zinc in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-F, 1978.
99. -----. Map Showing Geochemical Distribution and Abundance of Silver in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-G, 1978.
100. -----. Map Showing Geochemical Distribution and Abundance of Gold in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-H, 1978.
101. -----. Map Showing Geochemical Distribution and Abundance of Copper in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-I, 1978.
102. -----. Map Showing Geochemical Distribution and Abundance of Lead in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-J, 1978.
103. -----. Map Showing Geochemical Distribution and Abundance of Molybdenum in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-K, 1978.
104. -----. Map Showing Geochemical Distribution and Abundance of Bismuth in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-L, 1978.
105. -----. Map Showing Geochemical Distribution and Abundance of Chromium in Stream Sediments and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-M, 1978.
106. -----. Map Showing Geochemical Distribution and Abundance of Tungsten in Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-N, 1978.
107. -----. Map Showing Geochemical Distribution and Abundance of Barium in Stream Sediment and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-O, 1978.
108. -----. Map Showing Geochemical Distribution and Abundance of Arsenic in Stream Sediment and Heavy-Mineral Concentrates, Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-P, 1978.
109. Moffit, F. H. Mining in the Kotsina, Chitina, Chistochina, and Valdez Creek Regions. U.S. Geol. Surv. Bull. 379, 1909, pp. 153-160.
110. -----. The Upper Susitna and Chistochina Districts. U.S. Geol. Surv. Bull. 480, 1911, pp. 112-128.
111. -----. Headwater Regions of Gulkana and Susitna Rivers, Alaska. U.S. Geol. Surv. Bull. 498, 1912, 82 pp.
112. -----. Preliminary Report on the Broad Pass Region. U.S. Geol. Surv. Bull. 592, 1914, pp. 301-306.

113. Miller, R. J., G. C. Curtin, and B. Csejtey, Jr. Mining in the Valdez Creek Placer District. U.S. Geol. Surv. Bull. 592, 1914, pp. 307-308.
114. ----- The Broad Pass Region, Alaska. U.S. Geol. Surv. Bull. 608, 1915, 80 pp.
115. Mulligan, J. J., R. S. Warfield, and R. R. Wells. Sampling a Gold-Copper Deposit, Golden Zone Mine, South-Central Alaska. BuMines OFR 9-67, 1967, 59 pp.
116. Nelson, S. W., and B. L. Reed. Surficial Deposits Map of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-J, 1978.
117. Nokelberg, W. J., N. R. D. Albert, G. C. Bond, P. L. Herzon, R. T. Miyaoka, W. H. Nelson, D. H. Richter, T. E. Smith, J. H. Stout, W. Yeend, and R. E. Zehner. Geologic Map of the Southern Part of Mount Hayes Quadrangle, Alaska. U.S. Geol. Surv. OFR 82-52, 1982, 26 pp.
118. O'Leary, R. M., G. W. Day, E. F. Cooley, G. C. Curtin, and C. M. McDougal. Spectrographic and Chemical Analysis of Geochemical Samples from Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-143, 1978, 141 pp.
119. Ransome, A. L., and W. H. Kearns. Names and Definitions of Regions, Districts, and Subdistricts in Alaska (Used by the Bureau of Mines in Statistical and Economic Studies Covering the Mineral Industry of the Territory). BuMines IC 7679, 1954, 91 pp.
120. Reed, B. L. Disseminated Tin Occurrence Near Coal Creek, Talkeetna Mountains D-6 Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-77, 1978, 8 pp.
121. Reed, B. L., G. C. Curtin, A. Griscom, S. W. Nelson, D. A. Singer, and W. C. Steele. The Alaskan Mineral Resource Assessment Program: Background Information to Accompany Folio of Geologic and Mineral Resource Maps of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Circ. 775, 1979, 17 pp.
122. Reed, B. L., and S. W. Nelson. Geologic Map of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-A, 1977.
123. Reed, B. L., S. W. Nelson, G. C. Curtin, and D. A. Singer. Mineral Resources Map of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-D, 1978.
124. Reed, J. C., Jr. Geology of the Mount McKinley Quadrangle, Alaska. U.S. Geol. Surv. Bull. 1108-A, 1961, 36 pp.
125. Renshaw, A. L., Jr. Summary Report - Matanuska-Susitna Borough Surficial Geology (Generalized) with Distribution of Mineral Discoveries. Prepared for the Matanuska-Susitna Borough, 1979, 42 pp.
126. Renshaw, D. E. Matanuska-Susitna Borough, Summary of Mineral Resources. Prepared under a Grant by the AK. Div. of Geol. and Geophysical Surv., The Mapmakers, Palmer, AK, 1983, 48 pp.
127. Richter, D. H. Geology of the Portage Creek - Susitna River Area. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. 3, 1963.
128. Robinson, G. D., H. Wedow, Jr., and J. B. Lyons. Radioactivity Investigations in the Cache Creek Area, Yentna District, Alaska, 1945. U.S. Geol. Surv. Bull. 1024-A, 1955, 21 pp.
129. Rose, A. W. Geology of an Area on the Upper Talkeetna River, Talkeetna Mountains Quadrangle. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. 32, 1967, 7 pp.

130. Rose, A. W., and R. H. Saunders. Geology and Geochemical Investigations Near Paxson, Northern Copper River Basin. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. 13, 1965, 35 pp.
131. Ross, C. P. Mineral Deposits Near the West Fork of the Chulitna River, Alaska. U.S. Geol. Surv. Bull. 849-E, 1933, pp. 289-333.
132. -----. The Valdez Creek Mining District, Alaska. U.S. Geol. Surv. Bull. 849-H, 1933, pp. 425-468.
133. Rutledge, F. A. Investigation of the W. E. Dunkle Coal Mine Costello Creek, Chulitna District, Alaska. BuMines RI 4360, 1948, 9 pp.
134. Rutledge, F. A., R. L. Thorne, W. H. Kearns, and J. J. Mulligan. Preliminary Report: Nonmetallic Deposits Accessible to the Alaska Railroad as Possible Sources of Raw Materials for the Construction Industry. BuMines RI 4932, 1953, 129 pp.
135. Salisbury and Dietz, Inc. 1983 Mineral Resource Studies in the Kantishna Hills and Dunkle Mine Areas, Denali National Park and Preserve, Alaska (Contract No. S0134031). BuMines OFR 129-84, 1984, 3 v., 1080 pp.
136. Saunders, R. H. Ready Cash Prospect. Territory of AK, Dept. of Mines PR 67-2, 1954.
137. -----. Report on a Reconnaissance by Martin W. Jasper and Robert H. Saunders on Upper Butte Creek, Tributary of the Susitna River. Territory of AK, Dept. of Mines MI 67-2, 1955, 3 pp.
138. -----. Report on the Examination of the Greathouse Copper Prospect, Healy Quadrangle. Territory of AK, Dept. of Mines PE 67-3, 1957, 3 pp.
139. -----. The K-M Copper Prospects in August 1957. Territory of AK, Dept. of Mines PE 68-2, 1957, 13 pp.
140. -----. Ghezzi Copper Prospect. Territory of AK, Dept. of Mines PE 68-5, 1957.
141. -----. Susitna-Maclaren Area. AK. Div. of Geol. and Geophysical Surv. Rep. for the Year 1961, 1961, pp. 37-40.
142. Selvig, W. A., W. H. Ode, and J. D. Davis. Low-Temperature Carbonization of Alaskan Coals. BuMines Tech. Paper 668, 1944, 16 pp.
143. Shacklette, H. T. Bryophytes Associated with Mineral Deposits and Solutions in Alaska. U.S. Geol. Surv. Bull. 1198-C, 1965, 18 pp.
144. Shepard, J. G. Broad Pass District. Territory of AK, Dept. of Mines MR 67-3, 1925.
145. -----. Golden Zone Property (Wells Bros.). Territory of AK, Dept. of Mines PE 67-1, 1925.
146. Singer, D. A., B. Csejtey, Jr., and R. J. Miller. Map and Discussion of the Metalliferous and Selected Nonmetalliferous Mineral Resources of the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-Q, 1978, 33 pp.
147. Smith, P. S. Mineral Industry of Alaska in 1924. U.S. Geol. Surv. Bull. 783-A, 1926, 39 pp.
148. -----. Mineral Industry of Alaska in 1926. U.S. Geol. Surv. Bull. 797, 1929, pp. 1-50.
149. -----. Mineral Industry of Alaska in 1927. U.S. Geol. Surv. Bull. 810-A, 1930, pp. 1-64.
150. -----. Mineral Industry of Alaska in 1928. U.S. Geol. Surv. Bull. 813-A, 1930, 96 pp.

151. Smith, P. S. Mineral Industry of Alaska in 1929. U.S. Geol. Surv. Bull. 824-A, 1930, 109 pp.
152. ----- Mineral Industry of Alaska in 1930. U.S. Geol. Surv. Bull. 836-A, 1931, 115 pp.
153. ----- Mineral Resources of Alaska in 1931. U.S. Geol. Surv. Bull. 844, 1934, pp. 1-82.
154. ----- Mineral Industry of Alaska in 1932. U.S. Geol. Surv. Bull. 857-A, 1934, 91 pp.
155. ----- Mineral Industry of Alaska in 1933. U.S. Geol. Surv. Bull. 864-A, 1934, 82 pp.
156. ----- Mineral Industry of Alaska in 1934. U.S. Geol. Surv. Bull. 868-A, 1936, 83 pp.
157. ----- Mineral Industry of Alaska in 1935. U.S. Geol. Surv. Bull. 880-A, 1937, 95 pp.
158. ----- Mineral Industry of Alaska in 1936. U.S. Geol. Surv. Bull. 897-A, 1938, 107 pp.
159. ----- Mineral Industry of Alaska in 1937. U.S. Geol. Surv. Bull. 910-A, 1939, 113 pp.
160. ----- Mineral Industry of Alaska in 1938. U.S. Geol. Surv. Bull. 917-A, 1939, 113 pp.
161. ----- Mineral Industry of Alaska in 1939. U.S. Geol. Surv. Bull. 926-A, 1941, 97 pp.
162. ----- Occurrences of Molybdenum Minerals in Alaska. U.S. Geol. Surv. Bull. 926-C, 1942, pp. 161-207.
163. ----- Mineral Industry of Alaska in 1940. U.S. Geol. Surv. Bull. 933-A, 1942, 102 pp.
164. Smith, S. S. The Mining Industry in the Territory of Alaska During the Calendar Year 1916. BuMines B 153, 1917, 89 pp.
165. Smith, T. E. Gold Resource Potential of the Denali Bench Gravels, Valdez Creek Mining District, Alaska. Ch. in Geological Survey Research 1970. U.S. Geol. Surv. Prof. Paper 700-D, 1970, pp. D146-D152.
166. ----- Results of Geochemical Sampling in the Western Clearwater Mountains, Alaska. U.S. Geol. Surv. OFR 441, 1970, 249 pp.
167. ----- Geologic Map of the Western Clearwater Mountains. AK. Div. of Geol. and Geophysical Surv. AOF-29 (superceded by Geol. Rep. 60), 1973.
168. ----- Regional Geology of the Susitna-Maclaren River Area, Central Alaska. AK. Div. of Geol. and Geophysical Surv. Annu. Rep. 1973, 1974, pp. 3-6.
169. ----- Geology of the Clearwater Mountains, South-Central Alaska. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. 60, 1981, 72 pp.
170. Smith, T. E., T. K. Bundtzen, and T. C. Tribble. Stratabound Copper-Gold Occurrence, Northern Talkeetna Mountains, Alaska. AK. Div. of Geol. and Geophysical Surv. Misc. Paper 3, 1975, 7 pp.
171. Smith, T. E., G. L. Kline, J. T. Kline, and N. D. Coursey. Analysis of Rock and Stream-Sediment Samples, Healy A-2 Quadrangle, South-Central Alaska. AK. Div. of Geol. and Geophysical Surv. AOF-69, 1975.
172. Smith, T. E., T. C. Tribble, and D. R. Stein. Preliminary Results of Stream Sediment Sampling, Upper Maclaren River Area, South-Central Alaska. AK. Div. of Geol. and Geophysical Surv. Misc. Paper 2, 1972, 6 pp.

173. Smith, T. E., T. C. Tribble, and D. R. Stein. Analysis of Rock and Stream Sediment Samples, Mt. Hayes A-6 Quadrangle, South-Central Alaska. AK. Div. of Geol. and Geophysical Surv. Geochemical Rep. 26, 1973.
174. State of Alaska. MinFile (Automated System for Alaska Mining Claim Information). (Taken from Kardex Filing System.) AK. Div. of Geol. and Geophysical Surv., Fairbanks, AK.
175. State of Alaska, Department of Commerce and Economic Development, Office of Mineral Development. The Role of Placer Mining in the Alaska Economy. Study conducted by Louis Berger and Assoc., Fairbanks, AK, 1978, 22 pp.
176. Steele, W. C., and N. R. D. Albert. Interpretation of Landsat Imagery of the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-C, 1978.
177. Steele, W. C., and J. R. LeCompte. Map Showing Interpretation of Landsat Imagery of the Talkeetna Mountains Quadrangle, Alaska. U.S. Geol. Surv. OFR 78-558-D, 1978.
178. Stevens, D. L. Geology and Geochemistry of the Denali Prospect, Clearwater Mountains, Alaska. Ph.D. Thesis, Univ. of AK., Fairbanks, College, AK, 1970.
179. Swainbank, R. C., T. E. Smith, and D. L. Turner. Geology and K-Ar Age of Mineralized Intrusive Rocks from the Chulitna Mining District, Central Alaska. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. 55, 1977, pp. 23-28.
180. Thurmond, F. L. Ready Cash Group. Territory of AK, Dept. of Mines MR 67-1, 1918.
181. Thurow, G. Geology of Coal Creek Tin Prospect, South-Central Alaska. AK. Miners J., v. 11, No. 12, 1983, 24 pp.
182. Tripp, R. B., R. C. Karlson, and G. C. Curtin. Maps Showing Mineralogical Data for Heavy-Mineral Concentrates in the Talkeetna Quadrangle, Alaska. U.S. Geol. Surv. Misc. Field Studies Map MF 870-I, 1978.
183. Tuck, R. The Curry District, Alaska. U.S. Geol. Surv. Bull. 857-C, 1934, pp. 99-140.
184. -----. The Valdez Creek Mining District, Alaska in 1936. U.S. Geol. Surv. Bull. 897-B, 1938, pp. 108-131.
185. Turner, D. L., and T. E. Smith. Geochronology and Generalized Geology of the Central Alaska Range, Clearwater Mountains, and Northern Talkeetna Mountains. AK. Div. of Geol. and Geophysical Surv. AOF-72, 1974, 10 pp.
186. U.S. Bureau of Mines. Analyses of Alaska Coals. BuMines Tech. Paper 682, 1946, 114 pp.
187. -----. Alaska 1:250,000 Scale Quadrangle Map Overlays Showing Mineral Deposit Locations, Principle Minerals, and Number and Type of Claims. BuMines OFR 20-73, 1973.
188. U.S. Geological Survey. Geological Survey Research 1964, Chapter A. U.S. Geol. Surv. Prof. Paper 501-A, 1964, 367 pp.
189. -----. Geological Survey Research 1964, Chapter C. U.S. Geol. Surv. Prof. Paper 501-C, 1964, 197 pp.
190. Wahrhaftig, C. Physiographic Divisions of Alaska. U.S. Geol. Surv. Prof. Paper 482, 1965, 52 pp.
191. Warfield, R. S. Cantwell Manganese Deposit. Territory of AK, Dept. of Mines MR 67-8, 1954.
192. -----. Some Nonmetallic Mineral Resources for Alaska's Construction Industry. BuMines RI 6002, 1962, 25 pp.

193. Waring, G. A. Nonmetalliferous Deposits in the Alaska Railroad Belt. U.S. Geol. Surv. Circ. 18, 1947, 9 pp.
194. Wedow, H., M. G. White, and R. M. Moxham. Interim Report on an Appraisal of the Uranium Possibilities of Alaska. Trace Elements Memorandum Report 235. U.S. Geol. Surv. OFR 51, 1951, 124 pp.
195. Wells, R. R. Laboratory Concentration of Various Alaska Copper Ores. BuMines RI 5245, 1956, 9 pp.
196. White, M. G., W. S. West, G. E. Tolbert, A. E. Nelson, and J. R. Houston. Preliminary Summary of Reconnaissance for Uranium in Alaska, 1951. U.S. Geol. Surv. Circ. 196, 1952, 17 pp.
197. Wimmeler, N. L. Valdez Creek Lode Prospects. Territory of AK, Dept. of Mines MR 67-2, 1925, 5 pp.
198. Yeend, W. E. Placer Gold Deposits, Mt. Hayes Quadrangle, Alaska. Ch. in Silberman, M. L., C. W. Field, and A. L. Berry, eds., Proceedings of the Symposium on Mineral Deposits of the Pacific Northwest. U.S. Geol. Surv. OFR 81-355, 1981, pp. 74-83.
199. -----. Placers and Placer Mining in the Healy Quadrangle, Southern Alaska. Ch. in The United States Geological Survey in Alaska: Accomplishments During 1981. U.S. Geol. Surv. Circ. 868, 1984, pp. 95-98.
200. Zehner, R. E., E. H. Cobb, W. J. Nokleberg, and N. R. D. Albert. Geologic Bibliography of the Mount Hayes Quadrangle, Alaska. U.S. Geol. Surv. OFR 80-513, 1980, 28 pp.

APPENDIX - SAMPLE RESULTS FROM THE VALDEZ CREEK
MINING DISTRICT, ALASKA

Explanation

- Sample Number/Year : Refers to field sample numbers and year sample was taken. Sample locations are shown on figure 2.
- Material Type : Refers to type of material collected at the sampling site. The following material types were collected.
- Stream Sed - Stream sediment
 - SL/SS/CG - Slate, sandstone, conglomerate
 - Maf Volc - Mafic volcanic rock
 - Maf Plut - Mafic plutonic rock
 - Fel Plut - Felsic plutonic rock
 - Fel Plut Q - Felsic plutonic rock with quartz veins
 - Sed Rk/Q - Sedimentary rock with quartz veins
 - Placer - Concentrates from 1/10 cu.yd. of gravel run through a sluice box
 - Calc - Calcite vein
 - Sed/Volc - Sedimentary and volcanic rocks in area
- Rock Type : Refers to rock types in the area of sampling as shown on 1:250,000 scale geologic maps. The rock types mapped as being present are:
- Qal - Unconsolidated deposits
 - Meta Sed - Metasedimentary rocks, including all non-igneous rocks
 - Maf Volc - Mafic volcanic rocks
 - Fel Int - Felsic intrusive rocks
- Rock Age : Refers to the geologic age of the underlying rock groups as shown on 1:250,000 scale geologic maps.
- Quad 4 mile/1 mile : Refers to the 1:250,000 and 1:63,360 scale USGS quadrangle maps covering the area.
- Sec/T/R/Mer : Refers to section, township, range, and meridian in which sample was collected.
- Fbx - Fairbanks

APPENDIX - SAMPLE RESULTS FROM THE VALDEZ CREEK
MINING DISTRICT, ALASKA - Continued

Location/Property : Refers to geographic location of sampling site and name of mine or claim.

KX/MAS/File : Refers to the Kardex number, Mineral Availability System (MAS) number, and Bureau file number.

Proj. No./Sub. : Refers to the project and/or subdivision the sample was taken for.

E. Sp. : Refers to semiquantitative emission spectrographic technique analysis. Results given in parts per million (ppm) unless otherwise noted.

AA/Wet (Geochem) : Refers to quantitative atomic absorption spectrophotometric technique analysis. Results given in parts per million (ppm).

Assay : Refers to fire assaying technique analysis. Results given in oz/st.

Sample Number/Year	:	1 / 84	:	2 / 84	:	3 / 84
Material Type	:	Quartz	:	Quartz	:	Metased/Q
Rock Type	:	Metased	:	Metased	:	Metased
Rock Age	*	Triassic	*	Triassic	*	Triassic
Quad 4 mile/1 mile	*	Healy / A-1	*	Healy / A-1	*	Healy / A-1
Sec/T/R/Mer	*	16 / 20S/ 2E / Fbx	*	17 / 20S/ 2E / Fbx	*	17 / 20S/ 2E / Fbx
Location/Property	:	Timberline Creek	:	Timberline Creek	:	Timberline Creek
KX/MAS/File	:	11 / 121 / 121	:	11 / 121 / 121	:	11 / 121 / 121
Proj. no./Sub.	:	Valdez Creek	:	Valdez Creek	:	Valdez Creek
Sample Type	:		:		:	

Element		E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay
: Aluminum	:			:			:			
: Antimony	:			:			:			
: Arsenic	:		<10	:		10	:		60	
* Barium	*			*			*			
* Beryllium	*			*			*			
* Bismuth	*			*			*			
: Boron	:			:			:			
: Calcium	:			:			:			
: Cadmium	:			:			:			
* Chromium	*			*			*			
* Cobalt	*		15	*		5	*		15	
* Columbium	*			*			*			
: Copper	:		80	:			:			
: Fluorine	:			:			:			
: Gallium	:			:			:			
* Germanium	*			*			*			
* Gold	*			0.107*			0.292*			0.820
* Hafnium	*			*			*			
: Indium	:			:			:			
: Iron	:		2.1	:		2.9	:		3.7	
: Lanthanum	:			:			:			
* Lead	*		20	*		15	*		800	
* Lithium	*			*			*			
* Manganese	*			*			*			
: Magnesium	:			:			:			
: Molybdenum	:			:			:			
: Niobium	:			:			:			
* Nickel	*			*			*			
* Phosphorous	*			*			*			
* Platinum	*			*			*			
: Rhenium	:			:			:			
: Scandium	:			:			:			
: Silver	:			0.07:			0.68:			0.16
* Silicon	*			*			*			
* Sodium	*			*			*			
* Strontium	*			*			*			
: Tantalum	:			:			:			
: Tellurium	:			:			:			
: Thallium	:			:			:			
* Tin	*			*			*			
* Titanium	*			*			*			
* Tungsten	*			*			*			
: Vanadium	:			:			:			
: Yttrium	:			:			:			
: Zinc	:			:			:			
* Zirconium	*			*			*			

Sample Number/Year	:	4 / 84	:	5 / 84	:	6 / 84
Material Type	:	Maf Volc / Q	:	Quartz	:	Quartz
Rock Type	:	Metased	:	Metased	:	Metased
Rock Age	*	Triassic	*	Triassic	*	Triassic
Quad 4 mile/1 mile	*	Healy / A-1	*	Healy / A-1	*	Healy / A-1
Sec/T/R/Mer	*	16/ 20S/ 2E / Fbx	*	21 / 20S/ 2E / Fbx	*	18 / 20S / 2E / Fbx
Location/Property	:	Timberline Ck/Campbell	:	Timberline Ck/Campbell	:	Black Ck/Black Ck Lode
KX/MAS/File	:	116/ 120 / 120	:	116 / 120 / 120	:	10 / 117 / 117
Proj. no./Sub.	:	Valdez Creek	:	Valdez Creek	:	Valdez Creek
Sample Type	:		:		:	

Element		E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay
: Aluminum	:									
: Antimony	:									
: Arsenic	:		550			800			50	
* Barium	*			*			*			*
* Beryllium	*			*			*			*
* Bismuth	*			*			*			*
: Boron	:									
: Calcium	:									
: Cadmium	:									
* Chromium	*			*			*			*
* Cobalt	*		30	*		30	*		<5	*
* Columbium	*			*			*			*
: Copper	:		225			800			35	
: Fluorine	:									
: Gallium	:									
* Germanium	*			*			*			*
* Gold	*			0.882*			0.078*			0.169
* Hafnium	*			*			*			*
: Indium	:									
: Iron	:		8.2			10			1.2	
: Lanthanum	:									
* Lead	*		50	*		30	*		80	*
* Lithium	*			*			*			*
* Manganese	*			*			*			*
: Magnesium	:									
: Molybdenum	:									
: Niobium	:									
* Nickel	*			*			*		<5	*
* Phosphorous	*			*			*			*
* Platinum	*			*			*			*
: Rhenium	:									
: Scandium	:									
: Silver	:			0.41:			0.04:			0.33
* Silicon	*			*			*			*
* Sodium	*			*			*			*
* Strontium	*			*			*			*
: Tantalum	:									
: Tellurium	:									
: Thallium	:									
* Tin	*			*			*			*
* Titanium	*			*			*			*
* Tungsten	*			*			*			*
: Vanadium	:									
: Yttrium	:									
: Zinc	:									
* Zirconium	*			*			*			*

Sample Number/Year	:	7 / 84	:	8 / 84	:	9 / 84
Material Type	:	Quartz	:	Quartz	:	Quartz
Rock Type	:	Metased	:	Metased	:	Metased
Rock Age	*	Triassic	*	Triassic	*	Triassic
Quad 4 mile/1 mile	*	Healy / A-1	*	Healy / A-1	*	Healy / A-1
Sec/T/R/Mer	*	18/ 20S/ 3E / Fbx	*	18 / 20S/ 3E / Fbx	*	18 / 20S / 3E / Fbx
Location/Property	:	Black Ck/Black Ck Lode	:	Black Ck/Black Ck Lode	:	Black Ck/Black Ck Lode
KX/MAS/File	:	10 / 117 / 117	:	10 / 117 / 117	:	10 / 117 / 117
Proj. no./Sub.	:	Valdez Creek	:	Valdez Creek	:	Valdez Creek
Sample Type	:		:		:	

Element		E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay
: Aluminum	:			:			:			:
: Antimony	:			:			:			:
: Arsenic	:		750	:		500	:		420	:
* Barium	*			*			*			*
* Beryllium	*			*			*			*
* Bismuth	*			*			*			*
: Boron	:			:			:			:
: Calcium	:			:			:			:
: Cadmium	:			:			:			:
* Chromium	*			*			*			*
* Cobalt	*		15	*		10	*		20	*
* Columbium	*			*			*			*
: Copper	:		64	:		45	:		30	:
: Fluorine	:			:			:			:
: Gallium	:			:			:			:
* Germanium	*			*			*			*
* Gold	*			0.133*			0.013*			0.006
* Hafnium	*			*			*			*
: Indium	:			:			:			:
: Iron	:		3.5	:		3.1	:		4.8	:
: Lanthanum	:			:			:			:
* Lead	*		30	*		15	*		20	*
* Lithium	*			*			*			*
* Manganese	*			*			*			*
: Magnesium	:			:			:			:
: Molybdenum	:			:			:			:
: Niobium	:			:			:			:
* Nickel	*		<5	*		<5	*		5	*
* Phosphorous	*			*			*			*
* Platinum	*			*			*			*
: Rhenium	:			:			:			:
: Scandium	:			:			:			:
: Silver	:			0.21:			<0.01:			<0.01
* Silicon	*			*			*			*
* Sodium	*			*			*			*
* Strontium	*			*			*			*
: Tantalum	:			:			:			:
: Tellurium	:			:			:			:
: Thallium	:			:			:			:
* Tin	*			*			*			*
* Titanium	*			*			*			*
* Tungsten	*			*			*			*
: Vanadium	:			:			:			:
: Yttrium	:			:			:			:
: Zinc	:			:			:			:
* Zirconium	*			*			*			*

Sample Number/Year	:	10 / 84	:	11 / 84	:	12 / 84
Material Type	:	Quartz	:	Mill Pr.	:	Maf Volc
Rock Type	:	Metased	:	Metased	:	Mafvol
Rock Age	*	Triassic	*	Triassic	*	Triassic
Quad 4 mile/1 mile	*	Healy / A-1	*	Healy / A-1	*	Healy / A-1
Sec/T/R/Mer	*	18/ 20S/ 3E / Fbx	*	18 / 20S/ 3E / Fbx	*	34 / 20S / 3E / Fbx
Location/Property	:	Black Ck/Black Ck Lode	:	Black Ck/Black Ck Lode	:	Windy Ck/Denali
KX/MAS/File	:	10 / 117 / 117	:	10 / 117 / 117	:	142 / 008 / 8
Proj. no./Sub.	:	Valdez Creek	:	Valdez Creek	:	Valdez Creek
Sample Type	:		:		:	

Element		E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay
: Aluminum	:			:			:			:
: Antimony	:			:			:			:
: Arsenic	:		130	:		600	:			:
* Barium	*			*			*			*
* Beryllium	*			*			*			*
* Bismuth	*			*			*			*
: Boron	:			:			:			:
: Calcium	:			:			:			:
: Cadmium	:			:			:			:
* Chromium	*			*			*		80	*
* Cobalt	*		20	*		5	*		10	*
* Columbium	*			*			*			*
: Copper	:		25	:		65	:		180	:
: Fluorine	:			:			:			:
: Gallium	:			:			:			:
* Germanium	*			*			*			*
* Gold	*			<0.003*			0.008*			*
* Hafnium	*			*			*			*
: Indium	:			:			:			:
: Iron	:		4.8	:		3.5	:		3.8	:
: Lanthanum	:			:			:			:
* Lead	*		30	*		20	*		25	*
* Lithium	*			*			*			*
* Manganese	*			*			*		4400	*
: Magnesium	:			:			:			:
: Molybdenum	:			:			:			:
: Niobium	:			:			:			:
* Nickel	*		<5	*		<5	*		150	*
* Phosphorous	*			*			*			*
* Platinum	*			*			*			*
: Rhenium	:			:			:			:
: Scandium	:			:			:			:
: Silver	:			<0.01:			<0.01:			:
* Silicon	*			*			*			*
* Sodium	*			*			*			*
* Strontium	*			*			*			*
: Tantalum	:			:			:			:
: Tellurium	:			:			:			:
: Thallium	:			:			:			:
* Tin	*			*			*			*
* Titanium	*			*			*		3400	*
* Tungsten	*			*			*			*
: Vanadium	:			:			:			:
: Yttrium	:			:			:			:
: Zinc	:			:			:		265	:
* Zirconium	*			*			*			*

Sample Number/Year	:	13 / 84	:	14 / 84	:	15 / 84
Material Type	:	Maf Volc	:	Maf Volc	:	Placer
Rock Type	:	Mafvol	:	Mafvol	:	Qal
Rock Age	*	Permian-Triassic	*	Permian-Triassic	*	Cretaceous
Quad 4 mile/1 mile	*	Healy / A-1	*	Healy / A-1	*	Healy / A-1
Sec/T/R/Mer	*	34 / 20S/ 3E / Fbx	*	34 / 20S/ 3E / Fbx	*	6 / 21S/ 2E / Fbx
Location/Property	:	Windy Ck / Denali	:	Windy Ck / Denali	:	Windy Ck / Placer
KX/MAS/File	:	142/ 008 / 8	:	142 / 008 / 8	:	151 / 171 / 171
Proj. no./Sub.	:	Valdez Creek	:	Valdez Creek	:	Valdez Creek
Sample Type	:		:		:	

Element		E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay	E. Sp	AA/Wet	Assay
: Aluminum	:			:			:			
: Antimony	:			:			:			
: Arsenic	:			:			:			
* Barium	*			*			*			
* Beryllium	*			*			*			
* Bismuth	*			*			*			
: Boron	:			:			:			
: Calcium	:			:			:			
: Cadmium	:			:			:			
* Chromium	*		10	*		120	*			
* Cobalt	*		45	*		<5	*			
* Columbium	*			*			*			
: Copper	:		5.6 pct	:		370	:			
: Fluorine	:			:			:			
: Gallium	:			:			:			
* Germanium	*			*			*			
* Gold	*			*			*		0.0027 oz/cu.yd.	
* Hafnium	*			*			*			
: Indium	:			:			:			
: Iron	:		19	:		0.63	:			
: Lanthanum	:			:			:			
* Lead	*		15	*		15	*			
* Lithium	*			*			*			
* Manganese	*		2200	*		430	*			
: Magnesium	:			:			:			
: Molybdenum	:			:			:			
: Niobium	:			:			:			
* Nickel	*		10	*		<5	*			
* Phosphorous	*			*			*			
* Platinum	*			*			*			
: Rhenium	:			:			:			
: Scandium	:			:			:			
: Silver	:			:			:			
* Silicon	*			*			*			
* Sodium	*			*			*			
* Strontium	*			*			*			
: Tantalum	:			:			:			
: Tellurium	:			:			:			
: Thallium	:			:			:			
* Tin	*			*			*			
* Titanium	*		750	*		1300	*			
* Tungsten	*			*			*			
: Vanadium	:			:			:			
: Yttrium	:			:			:			
: Zinc	:		215	:		20	:			
* Zirconium	*			*			*			