MIRL Report No. 45

A SUMMARY OF GOLD FINENESS VALUES FROM ALASKA PLACER DEPOSITS

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March, 1981

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ABSTRACT

Gold fineness values for Alaskan placer deposits were calculated using mint return production records and the following formula for gold fineness:

$$\text{Fineness} = (Au/(Au + Ag)) \times 1000.$$

Past gold and silver production records from individuals and mining companies for the period 1900-1974 from 800 creeks in Alaska were examined and 550 creeks with production in excess of 100 troy ounces of gold were selected for data analysis. The data are summarized according to 41 mining districts and six regions.

The overall mean fineness for the 550 samples is 889, the standard deviation of the mean is 28.57, the 95% confidence interval for the mean is 880-898. The mean gold fineness values for the six regions studied are:

	Fineness	No. of Districts
Seward Peninsula	908	9
Upper Yukon-Tanana	884	11
Chandalar-Koyukuk	898	2
Lower Yukon-Kuskokwim	880	9
Copper-Susitna	886	8
Southeastern	893	3

The values for individual placers range from 567-995. One-way analysis of variance among the six regions and the 41 districts shows that the regions and districts can't be distinguished on the basis of gold fineness. The Kantishna district is anomalous and has the lowest mean value of 789, the lowest individual sample value of 567 and a coefficient of variation of 16 versus the average coefficient of variation of 4.33. The Rampart and Council districts have a mean fineness of 915, the highest mean values of the districts. Several districts, Kantishna in particular, have bimodal distributions of fineness, suggesting different sources of gold or different processes affecting deposition.

We were unable to relate the gold deposits to particular host rocks or to discern clearly the relationship of intrusive rocks to the placer deposits.

ACKNOWLEDGEMENTS

The report is the first in a series of publications by the Mineral Industry Research Laboratory and the Alaska Division of Geological and Geophysical Surveys under a special appropriation by the Alaska State Legislature to the School of Mineral Industry to conduct a "Mineral Appraisal of Interior Alaska Mining Districts". This program was initiated at the request of the Fairbanks North Star Borough. Funding for the report was supplimented by a grant under the Mining and Mineral Resources Research Institute, Office of Surface Mining, U.S. Department of Interior.

The photograph on the cover of the publication is from the Bunnel Collection, University Archives, Elmer E. Rasmuson Library, University of Alaska, Fairbanks.

Introduction

The expression of the relative quantities of gold and silver in a mineral deposit can be described by two methods; first as the simple ratio of gold to silver and second as the "true fineness" which is the ratio of gold to gold plus silver multiplied by 1000 (Boyle, 1979, p. 197). Note that "fineness" as generally defined is the parts gold per thousand parts alloy, which could include base metals. However, as used in this paper, "fineness" is the ratio of gold to gold plus silver times 1000.

Sample calculation of gold silver ratio and true fineness.

Au = gold   Ag = silver

Gold to silver ratio = Au/Ag   True fineness = (Au/(Au+Ag)) x 1000

EXAMPLE

Production record

Gold Creek

Au = 975 troy ounces

Ag = 105 troy ounces

Gold to silver ratio = Au/Ag = 975/105 = 9.29

True fineness = (Au/(Au+Ag)) x 1000 =

(975/(975+105)) x 1000 = 903

The advantage of using the fineness value rather than a simple ratio in statistical reduction of data has been reviewed by Koch and Link (1971). Although the use of fineness values is preferable in data reduction and analysis much of the literature deals with the simple Au/Ag ratio. In this discussion both expressions will be utilized since much of the referenced literature deals with Au/Ag ratios.

Boyle (1979) has extensively reviewed the literature on the Au/Ag ratios of the various types of gold deposits and a summary of his conclusions are listed in Appendix I. The major conclusion bearing on this paper is that gold placers always have Au/Ag ratios greater than 1.

In this investigation production records from approximately 800 creeks in Alaska were reviewed. These production records were primarily mint returns reported by individuals and mining companies up through 1974. These records are not inclusive of all the production from Alaska nor do they include all of the production from a given creek. The records report the number of troy ounces of gold and silver produced and the last date of recorded production. Fineness values were calculated for each creek with a record of at least ten troy ounces of silver. By this method a sample size of about one hundred ounces was insured thus increasing the reliability of a given sample. Fineness values for 550 creeks were determined and are listed in this report. These fineness values represent past production records and should not be used as a basis for determining the fineness of current production on a given creek.

Previous Investigations on Fineness of Gold From Alaskan Placer Deposits

Smith (1941) discussed in detail the fineness of gold from Alaskan placer deposits. The data base included 1534 samples from 84 different creeks or areas in 41 separate mining districts. The analysis of the data only included a determination of the ranges in values and the percentage of values within selected ranges. The values range from a low of 565 to 970 fine. Twenty-three percent of the records had fineness above 900; forty-two percent were between 850 and 899; twenty-six percent were between 800 and 849; and nine percent were below 800 fine. Smith (1941) did not attempt to interpret the significance of the data nor did he attempt to present data from every creek in a given mining district.

We have calculated mean fineness values for each of the seven major regions that were defined by Smith (1941). The values are as follows: Southeastern, 898; Copper River, 888; Cook Inlet, 898; Yukon River, 882; Kuskokwin River, 892; Seward Peninsula, 907; and Kobuk River, 884.

Discussion of the Fineness of Placer Gold from Alaska by Mining District

The fineness values in Table 1 are tabulated by mining district (see Figure 1) in the same order as the data presented by Smith (1941). The means and standard deviations of fineness values were calculated for each mining district. Histograms for each district with at least eight samples are displayed in Figures 2 through 25. Figure 26 is a histogram of all fineness values listed in Table 1 and Figure 27 is a histogram of the means for all the mining districts. Both histograms in Figures 26 and 27 appear to be like that for a normal distribution. Note that the fineness scale (x axis) is not the same for all histograms. The means, standard deviations and ranges of fineness values for each mining district are listed in Table 2.

In Table 2 several statistics are calculated. These are the mean, standard deviation, standard normal variate and the coefficient of variation. The mean or arithmetic average measures the central tendency or most probable value, the standard deviation is a measure of the spread of the data about the mean. The standard normal variate $z = \frac{x_i - \bar{x}}{s}$, where x_i is the value of the observation, $\bar{x}$ is the mean, s is the standard deviation. z is measured in units of standard deviation and relates the observed values to the standard normal distribution from which probability statements can be made. The coefficient of variation is defined as

$CV = (s/\bar{x})\ 100$ and relates the spread of the values to the mean.

The values of the standard normal variate can be used to estimate the probability of obtaining a sample mean a certain number of standard deviations from the grand mean. On the average, we expect 68% of the values to fall between +- 1 s, 95% between +- 2s, and 99% between +- 3s of the mean. The probability of obtaining a value -3.5 s from the mean as in the case of the Kantishna values is 1 in 5000. Clearly, the Kantishna district values are anomalous.

From the above figures and Table 2 the following observations can be made:

1. The Circle, Kantishna, Koyukuk and Rampart districts appear to have bimodal distributions of fineness values, in that these three districts have samples with fineness values less than 750. Other samples in these districts had to be around 900 fineness.

2. The Kantishna district has the lowest single fineness value, 567, the lowest mean fineness value, 789, the highest standard deviation, 126, and the highest coefficient of variation, 15.97.

3. The Council district has the highest single fineness value, 995.

4. Of the districts with 4 or more samples, Gold Hill has the highest mean fineness, 920.

5. Of the districts with 4 or more samples, McKinley has the lowest standard deviation, 10, lowest coefficient of variation, 1.11.

In order to determine whether the districts could be distinguished by their fineness values, an analysis of variance (ANOVA) was conducted on the data in Table 1 using the Statistical Package for the Social Sciences published by the University of Kansas. The resulting F ratio is 4.314 and for 40 and 509 degrees of freedom (See Table 1a) at the 95 percent confidence level this value is significant. Under the Duncan procedure two subsets were determined. The first subset includes district numbers 2, 5, 6, 8, 11, 12, 13, 14, 17, 19, 21, 22, 24, 26, 31, 32 and 41 (see Table 2). The second subset included all the districts except district 22, the Kantishna district. Under the Tukey procedure the districts could not be divided into separate subsets. From the analysis of variance only the Kantishna district can be distinguished from the other districts by gold fineness value at the 95% significance level.

An analysis of variance (ANOVA) was also done on the means of the gold-fineness values from the different mining districts grouped according to geographic region. The data and groupings are shown in Table 3. The ANOVA was not significant at the 95% confidence level, meaning that the gold fineness values for the different regions are not significantly different.

The data in Table 3 show, however, that of the six regions examined, the Seward Peninsula districts have the highest mean fineness value of 905, and also tend to be the most uniform with a coefficient of variation of 1.02. The lower Yukon and Kuskokwin region, which includes the Kantishna district, has the lowest mean gold fineness of 880, and the greatest variability, as shown by a coefficient of variation of 4.14. The Southeastern region shows a greater variability but the samples making up the regional mean (3) and district mean (4), are so few that the variance is unusually high and is probably not representative of the region as a whole.

Without a detailed analysis of the regional geology of the individual mining districts, only a general hypothesis can be proposed to the account for the bimodal distributions and the dispersion of the data within individual districts. The districts which demonstrate bimodal distributions generally contain both metamorphosed sedimentary and volcanic rocks and intrusive igneous rocks. The metamorphic rocks are often host to massive sulfide mineral occurrences which tend to be high in silver relative to gold. Quartz-vein deposits are usually associated with intrusive igneous rocks and the gold fineness in quartz vein deposits is usually high. Placer deposits formed from the erosion of massive sulfide deposits would probably result in lower fineness values while the placer deposits formed from weathering and erosion of gold-quartz veins would generally have higher fineness values.

The dispersion in fineness values may be a function of source rocks however it may also be a function of depth of formation of the lode source. Quartz veins in or near an intrusive body would form at higher temperatures than those veins formed at greater distance from the heat source. Erosion of veins in the epithermal (low temperature) zone would produce placer deposits with a lower fineness than erosion of veins formed in the mesothermal (medium temperature) and hypothermal (high temperature) zone.

Forbes (1980) carried out scanning-electron microscope/x-ray spectrometric analysis studies on gold nuggets and found silver depletion rinds up to several microns thick on natural nuggets but not on man-made nuggets. The loss of silver in natural nuggets could be accounted for by the greater solubility of silver under atmospheric environmental conditions during and after placer formation. As grain size decreases the overall surface area increases, and relatively more silver will be leached. The theoretical result of such selective loss of silver is to increase the fineness of the placer gold. These observations are connected with those of Koshman and Yugay (1972) who showed that chemical or mechanical treatment of samples of placer gold increase the fineness of the gold by dissolving or releasing chemical or mineral impurities. Viljoen (1971) has noted the opposite effect in gold grains from the paleoplacer deposits of the Witwatersrand System. In this case, the theoretical fineness decreases with decreasing grain size. The opposite effect may be a function of differences in environmental conditions during and after deposition in the 2.7 billion-year old sediments. In either case, the fineness of the placer gold has been affected by the depositional environment. The effects of depositional environments must be considered in any hypothesis that attempts to explain the differences in the fineness of placer gold. In Alaska, high-organic contents in the alluvial deposits and permafrost conditions will affect the relative solubilities of gold and silver and will be major parameters affecting the environments of deposition of placer gold.

Areal Distribution of Placer Fineness Values in the Fairbanks Mining District

The rocks that crop out in the Fairbanks district are part of a sequence of metasedimentary and metaigneous rocks known as the Yukon-Tanana Uplands schist of Lower Paleozoic and or Precambrian age (Foster, et al 1973). The schist is both the host rock for the lode-gold deposits in the district as well as the bedrock unit for the placer gold deposits. This unit is composed of a structurally complex sequence of quartz muscovite schist, quartz mica schist, feldspathic schist, chlorite schist, biotite garnet schist, carbonaceous schist, calcareous schist and crystalline limestone. Recent work has shown that the unit also contains a variety of gneisses, calc-magnesian schist, phyllite, amphibolite and eclogite. The metamorphic sequence is intruded by Mesozoic and Tertiary age rocks that range in composition from diorite to granite. Rocks of the Fairbanks district have been affected by at least two major deformational events. The first metamorphic event is associated with a complete recrystallization of the parent rock and with the development of metamorphic mineral assemblages indicative of the middle and upper greenschist facies. A later phase of metamorphism appears to have been less intense and associated with the development of retrograde metamorphic mineral assemblages. The early recrystallization is associated with west northwest-trending folds, while the later phase is associated with folding about northeast-trending axes. Fold styles associated with the early recrystallization appear to be isoclinal and overturned to the northeast. Some folds are arcuate and recumbant. The northwest-trending folds appear to be overturned and (or) recumbant, with axial planes usually dipping to the south. The degree and direction of overturning is variable and related to the superimposed northeast-trending structures.

Chapman and Foster (1969) described 188 lode mineral deposits in the Fairbanks district. These include: gold quartz veins and fissure-zone replacement gold deposits, antimony, tungsten, lead and zinc mineralization parallel to the compositional layering and foliation of the Yukon Tanana Upland Schist and tungsten skarn mineralization in the schist adjacent to the Mesozoic and Tertiary intrusive rocks. With minor exceptions all the deposits contain at least trace amounts of gold and silver. Table 4 lists the host rocks for all the mineral occurrences in the district as well as those with only Hg-Sb-W-Au-Ag mineralization.

The placer deposits in the district are found along streams draining the Pedro Dome, Gilmore Dome and Ester Dome areas. Both Pedro Dome and Gilmore Dome are cored by complex intrusives, ranging in composition from granite to quartz diorite. Although no major outcrops of intrusive rocks have been mapped in the Ester Dome area numerous small irregular intrusive bodies and dikes have been mapped on the flanks of the dome. Since the placer and lode gold deposits in the district are restricted to these areas, earlier workers including Chapman and Foster (1969) thought that the intrusive rocks were the source of the gold. Whether the intrusives were the source of the gold or whether they simply provided the thermal energy to remobilize the precious metals in the Yukon Tanana Upland Schist, the intrusive center appears to have some spatial relationship to the placer deposits.

The role played by host rock and intrusive bodies in relation to the gold mineralization of the district is not clear. At present, we are examining this important question and it is expected that ongoing studies may yield data bearing on this problem.

Summary and Conclusions

The expression of the relative quantities of gold and silver in a mineral deposit can be described by either a simple ratio of gold to silver or as a fineness value. The relative quantity of gold and silver in a given deposit is a function of the complex physiochemical conditions that existed during and after deposition. The determination of these complex conditions may be partial guides to the discovery of additional mineralization.

Reported fineness values from Alaskan placer gold deposits range from 567 to 995. Although the individual mining districts cannot be distinguished by fineness values alone, several generalizations can be drawn. The Kantishna district has the lowest mean fineness of 789 and the lowest fineness value of 567, and the highest standard deviation of 126. The Rampart and Council districts have a mean fineness of 915 which is the highest mean value for the districts with four or more samples. The Council district has the highest fineness value of 995. The Circle, Hot Springs, Richardson, Kantishna, Koyukuk, Marshall, Georgetown and Tolovana districts have large coefficients of variation, bimodal distributions, thus suggesting different sources for the placer gold. This is particularly true for Kantishna district.

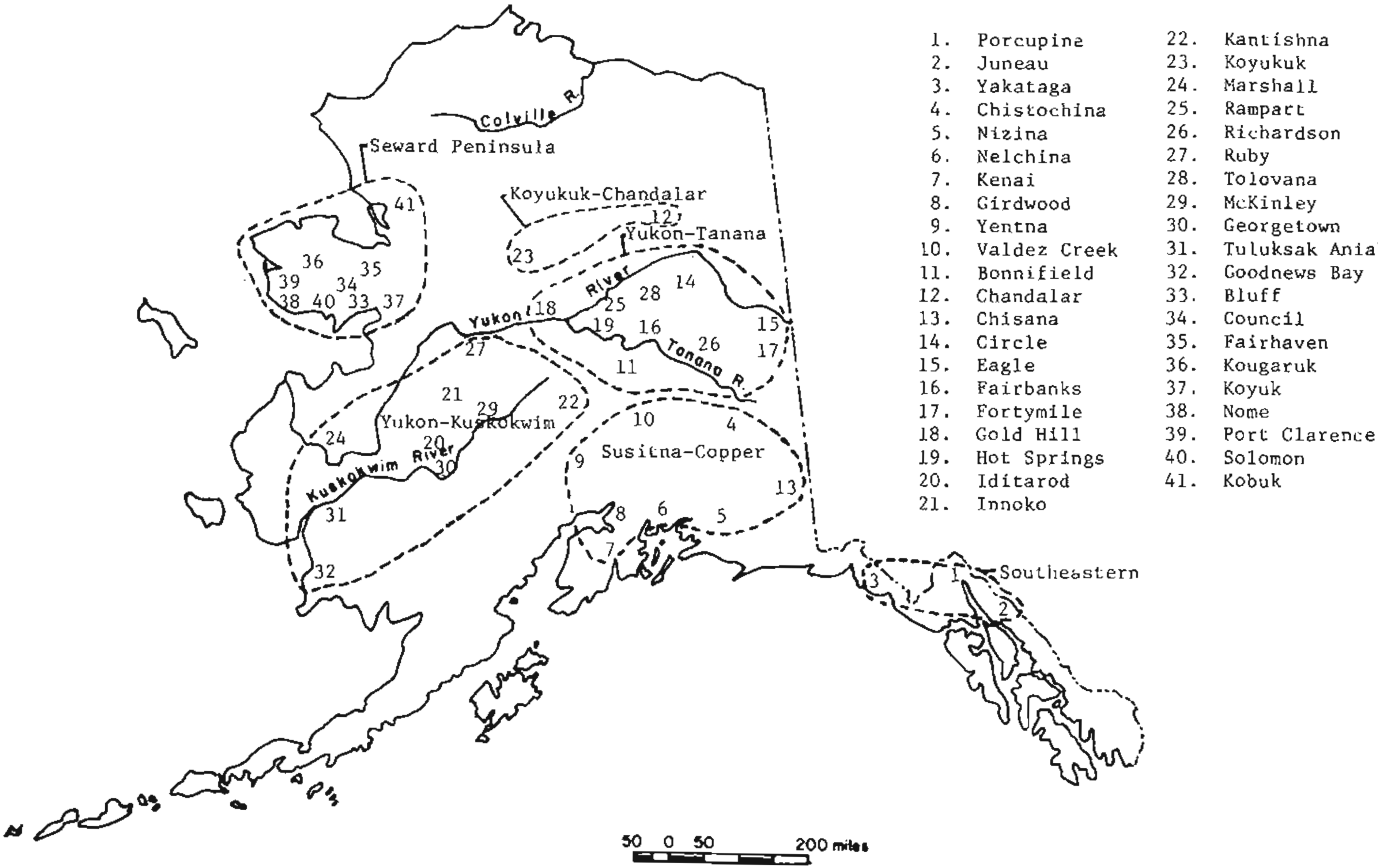

Figure 1. Location of major placer mining districts in Alaska.

TABLE 1

PLACER GOLD FINENESS

FOR

VARIOUS ALASKAN MINING DISTRICTS

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
01	PORCUPINE	PORCUPINE	SKAGWAY	941
02	JUNEAU	SILVERBOW BASIN	JUNEAU	826
03	YAKATAGA	WHITE	BERING GLACIER	900
03	YAKATAGA	YAKATAGA BEACH	BERING GLACIER	923
04	CHISTOCHINA	CHISANA	MT. HAYES	917
04	CHISTOCHINA	EAGLE	MT. HAYES	866
04	CHISTOCHINA	MIDDLE FORK CHISTOCHINA	MT. HAYES	924
04	CHISTOCHINA	MILLER GULCH	MT. HAYES	917
04	CHISTOCHINA	SLATE	MT. HAYES	921
05	NIZINA	BONANZA	MCCARTHY	842
05	NIZINA	CHITITU	MCCARTHY	926
05	NIZINA	COPPER	MCCARTHY	892
05	NIZINA	DAN	MCCARTHY	915
05	NIZINA	GOLCONDA	BERING GLACIER	906
05	NIZINA	REX	MCCARTHY	916
05	NIZINA	SKOOKUM GULCH	MCCARTHY	820
05	NIZINA	SLOPE	VALDEZ	828
06	NELCHINA	ALBERT	TALKEETNA MTS	847
07	KENAI	BEAR	SEWARD	901
07	KENAI	CANYON	SEWARD	901
07	KENAI	COOPER	SEWARD	900
07	KENAI	GULCH	SEWARD	901
07	KENAI	LYNX	SEWARD	901
07	KENAI	MILLS	SEWARD	900
07	KENAI	QUARTZ	SEWARD	899
07	KENAI	RESURRECTION	SEWARD	959
07	KENAI	SIXMILE	SEWARD	900
08	GIRDWOOD	CROW	ANCHORAGE	887
09	YENTNA	BIG BOULDER	TALKEETNA	878
09	YENTNA	BIRD	TALKEETNA	885
09	YENTNA	CACHE	TALKEETNA	899
09	YENTNA	CAMP	TALKEETNA	877
09	YENTNA	CHEECHAKO	TALKEETNA	916
09	YENTNA	DOLLAR	TALKEETNA	917
09	YENTNA	FALLS	TALKEETNA	956
09	YENTNA	FIRST AND DUTCH	TALKEETNA	881
09	YENTNA	GOLD	TALKEETNA	899
09	YENTNA	GOPHER GULCH	TALKEETNA	901
09	YENTNA	LITTLE WILLOW	TALKEETNA	873
09	YENTNA	MILLS	TALKEETNA	854

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
09	YENTNA	MILLS AND TWIN	TALKEETNA	863
09	YENTNA	NOTOBAC	TALKEETNA	902
09	YENTNA	NUGGET	TALKEETNA	904
09	YENTNA	PASS	TALKEETNA	897
09	YENTNA	POORMAN	TALKEETNA	896
09	YENTNA	PETERS	TALKEETNA	889
09	YENTNA	RUBY GULCH	TALKEETNA	900
09	YENTNA	SHORT	TALKEETNA	900
09	YENTNA	SLATE	TALKEETNA	902
09	YENTNA	THUNDER	TALKEETNA	854
09	YENTNA	WILLOW	ANCHORAGE	838
09	YENTNA	WILLOW	TALKEETNA	937
10	VALDEZ CREEK	LUCKY GULCH	HEALY	891
10	VALDEZ CREEK	VALDEZ	HEALY	951
10	VALDEZ CREEK	WHITE	HEALY	900
11	BONNIFIELD	DANIELS	FAIRBANKS	804
11	BONNIFIELD	DRY	HEALY	897
11	BONNIFIELD	EVA	FAIRBANKS	845
11	BONNIFIELD	GOLD KING	FAIRBANKS	862
11	BONNIFIELD	GRUBSTAKE	FAIRBANKS	870
11	BONNIFIELD	HOMESTAKE	FAIRBANKS	855
11	BONNIFIELD	LITTLE MOOSE	FAIRBANKS	878
11	BONNIFIELD	MARGUERITE	HEALY	926
11	BONNIFIELD	MOOSE	FAIRBANKS	830
11	BONNIFIELD	PLATTE	HEALY	901
11	BONNIFIELD	REX	FAIRBANKS	813
11	BONNIFIELD	TOTATLANIKA	FAIRBANKS	875
12	CHANDALAR	BIG	CHANDALAR	835
12	CHANDALAR	LITTLE SQUAW	CHANDALAR	958
12	CHANDALAR	ST. MARYS	CHANDALAR	900
12	CHANDALAR	SQUAW	CHANDALAR	867
12	CHANDALAR	TOBIN	CHANDALAR	847
13	CHISANA	BIG ELDORADO	NABESNA	835
13	CHISANA	CHISANA	NABESNA	836
13	CHISANA	GOLD RUN	NABESNA	861
13	CHISANA	LITTLE ELDORADO	NABESNA	805
13	CHISANA	SKOOKUM	NABESNA	906
14	CIRCLE	BIRCH	CIRCLE	874
14	CIRCLE	BONANZA	CIRCLE	984
14	CIRCLE	BOTTOM DOLLAR	CIRCLE	714
14	CIRCLE	BOULDER	CHARLEY RIVER	888
14	CIRCLE	BUTTE	CIRCLE	915
14	CIRCLE	COAL	CHARLEY RIVER	907
14	CIRCLE	CROOKED	CIRCLE	828
14	CIRCLE	DEADWOOD	CIRCLE	824
14	CIRCLE	DEEP	CIRCLE	902
14	CIRCLE	EAGLE	CIRCLE	879
14	CIRCLE	FAITH	CIRCLE	910
14	CIRCLE	HALF DOLLAR	CIRCLE	721
14	CIRCLE	HARRISON	CIRCLE	825
14	CIRCLE	INDEPENDENCE	CIRCLE	809
14	CIRCLE	KETCHEM	CIRCLE	769
14	CIRCLE	LOPER	CIRCLE	900
14	CIRCLE	MAMMOTH	CIRCLE	831

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
14	CIRCLE	MASTODON	CIRCLE	854
14	CIRCLE	MIDDLE FORK CHENA	CIRCLE	897
14	CIRCLE	MILLER	CIRCLE	860
14	CIRCLE	MINERAL	CHARLEY RIVER	954
14	CIRCLE	NORTH FORK HARRISON	CIRCLE	861
14	CIRCLE	PORTAGE	CIRCLE	806
14	CIRCLE	PORCUPINE	CIRCLE	803
14	CIRCLE	SHAMROCK	CIRCLE	899
14	CIRCLE	SOURDOUGH	CIRCLE	928
14	CIRCLE	SQUAW	CIRCLE	891
14	CIRCLE	SWITCH	CIRCLE	836
14	CIRCLE	VOLCANO	CIRCLE	899
14	CIRCLE	WOODCHOPPER	CHARLEY RIVER	923
15	EAGLE	ALDER	EAGLE	869
15	EAGLE	AMERICAN	EAGLE	920
15	EAGLE	BARNEY	EAGLE	910
15	EAGLE	BEN	EAGLE	889
15	EAGLE	BROKEN NECK	EAGLE	945
15	EAGLE	BULLION	EAGLE	864
15	EAGLE	DOME	CHARLEY RIVER	909
15	EAGLE	FOURTH OF JULY	CHARLEY RIVER	900
15	EAGLE	LUCKY GULCH	EAGLE	878
15	EAGLE	NUGGET	CHARLEY RIVER	854
15	EAGLE	SEVENTYMILE	EAGLE	918
16	FAIRBANKS	ALDER	LIVENGOOD	867
16	FAIRBANKS	BEDROCK	LIVENGOOD	829
16	FAIRBANKS	CHATANIKA	LIVENGOOD	894
16	FAIRBANKS	CHATHAM	LIVENGOOD	875
16	FAIRBANKS	CLEARY	LIVENGOOD	904
16	FAIRBANKS	CRANE GULCH	LIVENGOOD	908
16	FAIRBANKS	CRIPPLE	FAIRBANKS	865
16	FAIRBANKS	DEEP	LIVENGOOD	886
16	FAIRBANKS	NOME	LIVENGOOD	930
16	FAIRBANKS	ENGINEER	FAIRBANKS	901
16	FAIRBANKS	ESTER	FAIRBANKS	896
16	FAIRBANKS	EVA	FAIRBANKS	824
16	FAIRBANKS	FAIRBANKS	LIVENGOOD	896
16	FAIRBANKS	FIRST CHANCE	FAIRBANKS	915
16	FAIRBANKS	FISH	LIVENGOOD	902
16	FAIRBANKS	FLUME	FAIRBANKS	903
16	FAIRBANKS	FOX	FAIRBANKS	897
16	FAIRBANKS	GILMORE	FAIRBANKS	933
16	FAIRBANKS	GOLD HILL	FAIRBANKS	863
16	FAIRBANKS	GOLD STREAM	FAIRBANKS	883
16	FAIRBANKS	HAPPY	FAIRBANKS	961
16	FAIRBANKS	HILL	FAIRBANKS	931
16	FAIRBANKS	KOKOMO	LIVENGOOD	879
16	FAIRBANKS	LITTLE ELDORADO	LIVENGOOD	891
16	FAIRBANKS	NUGGET	FAIRBANKS	853
16	FAIRBANKS	OUR	LIVENGOOD	908
16	FAIRBANKS	PEARL	FAIRBANKS	908
16	FAIRBANKS	PEDRO	FAIRBANKS	913
16	FAIRBANKS	READY BULLION	FAIRBANKS	871
16	FAIRBANKS	ROSE	FAIRBANKS	885

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
16	FAIRBANKS	ST. PATRICKS	FAIRBANKS	878
16	FAIRBANKS	SMALLWOOD	FAIRBANKS	948
16	FAIRBANKS	STEAMBOAT GULCH	LIVENGOOD	901
16	FAIRBANKS	STEELE	FAIRBANKS	901
16	FAIRBANKS	TREASURE	LIVENGOOD	919
16	FAIRBANKS	TWIN	LIVENGOOD	898
16	FAIRBANKS	VAULT	LIVENGOOD	900
16	FAIRBANKS	WILDCAT	LIVENGOOD	899
16	FAIRBANKS	WELLOW	LIVENGOOD	868
16	FAIRBANKS	WOLF	LIVENGOOD	858
17	FORTYMILE	ATWATER	EAGLE	885
17	FORTYMILE	CAMP	EAGLE	904
17	FORTYMILE	CANYON	EAGLE	791
17	FORTYMILE	CHICKEN	EAGLE	833
17	FORTYMILE	DAVIS	EAGLE	885
17	FORTYMILE	DOME	EAGLE	907
17	FORTYMILE	FLATE	EAGLE	887
17	FORTYMILE	FORTYMILE	EAGLE	876
17	FORTYMILE	FORTY-FIVE PUP	EAGLE	916
17	FORTYMILE	FRANKLIN	EAGLE	883
17	FORTYMILE	HALL	EAGLE	844
17	FORTYMILE	INGLE	EAGLE	902
17	FORTYMILE	JACK WADE	EAGLE	879
17	FORTYMILE	LOST CHICKEN	EAGLE	927
17	FORTYMILE	LOST CHICKEN HILL	EAGLE	811
17	FORTYMILE	MONTANA	EAGLE	844
17	FORTYMILE	MOSQUITO FORK	EAGLE	871
17	FORTYMILE	MYERS	EAGLE	857
17	FORTYMILE	NAPOLEAN	EAGLE	876
17	FORTYMILE	NORTH FORK FORTYMILE	EAGLE	871
17	FORTYMILE	POKER	EAGLE	864
17	FORTYMILE	SMITH	EAGLE	836
17	FORTYMILE	SOUTH FORK FORTYMILE	EAGLE	869
17	FORTYMILE	SQUAW	EAGLE	886
17	FORTYMILE	STONEHOUSE	EAGLE	821
17	FORTYMILE	TURK	EAGLE	815
17	FORTYMILE	TWIN	EAGLE	873
17	FORTYMILE	UHLER	EAGLE	858
17	FORTYMILE	WADE	EAGLE	862
17	FORTYMILE	WALKERS FORK	EAGLE	883
17	FORTYMILE	WOODS	EAGLE	896
18	GOLD HILL	BEAR	MELOZITNA	912
18	GOLD HILL	GOLDEN	TANANA	892
18	GOLD HILL	GRANT	TANANA	941
18	GOLD HILL	LYNX	TANANA	901
18	GOLD HILL	MASON	MELOZITNA	952
19	HOT SPRINGS	AMERICAN	TANANA	875
19	HOT SPRINGS	ALEMEDA	TANANA	810
19	HOT SPRINGS	BOOTHBY	TANANA	886
19	HOT SPRINGS	BOULDER	TANANA	974
19	HOT SPRINGS	CACHE	TANANA	905
19	HOT SPRINGS	CHICAGO	TANANA	899
19	HOT SPRINGS	DRY	TANANA	890
19	HOT SPRINGS	EUREKA	TANANA	815

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
19	HOT SPRINGS	GLENN	TANANA	973
19	HOT SPRINGS	GLENN GULCH	TANANA	852
19	HOT SPRINGS	JACKSON	TANANA	844
19	HOT SPRINGS	MILLER	TANANA	868
19	HOT SPRINGS	NEVADA GULCH	TANANA	898
19	HOT SPRINGS	NEW YORK	TANANA	787
19	HOT SPRINGS	OMEGA	TANANA	788
19	HOT SPRINGS	PATTERSON	TANANA	871
19	HOT SPRINGS	PIONEER	TANANA	825
19	HOT SPRINGS	RHODE ISLAND	TANANA	792
19	HOT SPRINGS	ROSA	TANANA	924
19	HOT SPRINGS	SEATTLE	TANANA	782
19	HOT SPRINGS	SULLIVAN	TANANA	893
19	HOT SPRINGS	THANKSGIVING	TANANA	984
19	HOT SPRINGS	TOFTY	TANANA	820
19	HOT SPRINGS	WOODCHOPPER	TANANA	848
20	IDITAROD	BLACK	IDITAROD	925
20	IDITAROD	CHICKEN	IDITAROD	863
20	IDITAROD	CROOKED	IDITAROD	919
20	IDITAROD	DONLIN	IDITAROD	972
20	IDITAROD	FLAT	IDITAROD	902
20	IDITAROD	GLEN GULCH	IDITAROD	894
20	IDITAROD	GRANITE	IDITAROD	867
20	IDITAROD	HAPPY	IDITAROD	944
20	IDITAROD	JULIAN	IDITAROD	857
20	IDITAROD	MALAMUTE	IDITAROD	888
20	IDITAROD	MOORE	IDITAROD	883
20	IDITAROD	OTTER	IDITAROD	885
20	IDITAROD	PRINCE	IDITAROD	881
20	IDITAROD	QUARTZ	OPHIR	927
20	IDITAROD	SLATE	IDITAROD	855
20	IDITAROD	SNOW GULCH	IDITAROD	919
20	IDITAROD	TRAIL	IDITAROD	900
20	IDITAROD	UPGRADE	IDITAROD	871
20	IDITAROD	WILLOW	IDITAROD	898
21	INNOKO	BEAR	OPHIR	901
21	INNOKO	BEAVER	OPHIR	910
21	INNOKO	BEDROCK	OPHIR	844
21	INNOKO	BOOB	OPHIR	909
21	INNOKO	COLORADO	OPHIR	884
21	INNOKO	CRIPPLE	OPHIR	906
21	INNOKO	DODGE	OPHIR	911
21	INNOKO	ESPERONTO	OPHIR	864
21	INNOKO	ESTER	OPHIR	841
21	INNOKO	FOX GULCH	OPHIR	908
21	INNOKO	GANES	OPHIR	853
21	INNOKO	GOLD RUN	OPHIR	834
21	INNOKO	LITTLE	OPHIR	860
21	INNOKO	MACKIE	IDITAROD	946
21	INNOKO	MADISON	OPHIR	881
21	INNOKO	OPHIR	OPHIR	905
21	INNOKO	SPAULDING	IDITAROD	837
21	INNOKO	SPRUCE	OPHIR	873
21	INNOKO	VICTOR GULCH	OPHIR	890

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
21	INNOKO	YANKEE	OPHIR	900
22	KANTISHNA	CARIBOU	MT. MCKINLEY	677
22	KANTISHNA	CROOKED	MT. MCKINLEY	881
22	KANTISHNA	EUREKA	MT. MCKINLEY	906
22	KANTISHNA	FRIDAY	MT. MCKINLEY	806
22	KANTISHNA	GLACIER	MT. MCKINLEY	773
22	KANTISHNA	GLEN	MT. MCKINLEY	896
22	KANTISHNA	LITTLE MOOSE	MT. MCKINLEY	584
22	KANTISHNA	MOOSE	MT. MCKINLEY	812
22	KANTISHNA	STAMPEDE	MT. MCKINLEY	567
22	KANTISHNA	TWENTY-TWO PUP	MT. MCKINLEY	875
22	KANTISHNA	YELLOW	MT. MCKINLEY	898
23	KOYUKUK	ARCHIBALD	WISEMAN	900
23	KOYUKUK	BIRCH	WISEMAN	889
23	KOYUKUK	CREVICE	WISEMAN	865
23	KOYUKUK	EIGHTMILE	CHANDALAR	891
23	KOYUKUK	EMMA	WISEMAN	902
23	KOYUKUK	FAY GULCH	WISEMAN	908
23	KOYUKUK	FAY PUP	WISEMAN	864
23	KOYUKUK	GARNET	CHANDALAR	894
23	KOYUKUK	GOLD	WISEMAN	890
23	KOYUKUK	HAMMOND	WISEMAN	901
23	KOYUKUK	HAMMOND RIVER	WISEMAN	905
23	KOYUKUK	HOGATZA	HUGHES	950
23	KOYUKUK	INDIAN	HUGHES	943
23	KOYUKUK	JAY	WISEMAN	926
23	KOYUKUK	JIM	CHANDALAR	973
23	KOYUKUK	KOYUKUK	CHANDALAR	956
23	KOYUKUK	LAKE	CHANDALAR	964
23	KOYUKUK	LINDA	CHANDALAR	914
23	KOYUKUK	MASCOT	WISEMAN	961
23	KOYUKUK	MYRTLE	WISEMAN	917
23	KOYUKUK	NOLAN	WISEMAN	924
23	KOYUKUK	PORCUPINE	WISEMAN	903
23	KOYUKUK	SHEEP	CHANDALAR	965
23	KOYUKUK	SLATE	CHANDALAR	920
23	KOYUKUK	SOUTH FORK KOYUKUK	BETTLES	914
23	KOYUKUK	SMITH	WISEMAN	942
23	KOYUKUK	SPRING	WISEMAN	961
23	KOYUKUK	SWITH	WISEMAN	962
23	KOYUKUK	THOMPSON PUP	WISEMAN	936
23	KOYUKUK	TWELVEMILE	WISEMAN	920
23	KOYUKUK	UTOPIA	MELOZITNA	849
23	KOYUKUK	UTOPIA	WISEMAN	734
23	KOYUKUK	VERMONT	WISEMAN	921
23	KOYUKUK	WAKEUS	CHANDALAR	923
23	KOYUKUK	WILD	BETTLES	901
24	MARSHALL	BOBTAIL	RUSSIAN MISSION	833
24	MARSHALL	BUSTER	RUSSIAN MISSION	853
24	MARSHALL	DISAPPOINTMENT	RUSSIAN MISSION	833
24	MARSHALL	ELEPHANT	RUSSIAN MISSION	848
24	MARSHALL	FLAT	RUSSIAN MISSION	840
24	MARSHALL	KAKO	HOLY CROSS	819
24	MARSHALL	MONTEZUMA	RUSSIAN MISSION	950

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
24	MARSHALL	WEST FORK WILLOW	HOLY CROSS	899
24	MARSHALL	WILLOW	RUSSIAN MISSION	873
24	MARSHALL	WILSON	RUSSIAN MISSION	953
25	RAMPART	BIGMINOOK	TANANA	901
25	RAMPART	DAWSON	LIVENGOOD	883
25	RAMPART	FLORIDA	TANANA	908
25	RAMPART	GUNNISON	LIVENGOOD	883
25	RAMPART	HOOSIER	TANANA	967
25	RAMPART	HUNTER	TANANA	921
25	RAMPART	LITTLE MINOOK	TANANA	941
25	RAMPART	NEVADA GULCH	TANANA	898
25	RAMPART	QUAIL	LIVENGOOD	894
25	RAMPART	RUBY	TANANA	917
25	RAMPART	SLATE	TANANA	915
25	RAMPART	SOUTH FORK QUAIL	TANANA	953
26	RICHARDSON	BANNER	BIG DELTA	737
26	RICHARDSON	BUCKEYE	BIG DELTA	693
26	RICHARDSON	CARIBOU	BIG DELTA	896
26	RICHARDSON	DEMOCRAT	BIG DELTA	928
26	RICHARDSON	NO GRUB	BIG DELTA	899
26	RICHARDSON	PYNE	BIG DELTA	911
26	RICHARDSON	TENDERFOOT	BIG DELTA	901
27	RUBY	BEAR PUP	RUBY	889
27	RUBY	BIRCH	RUBY	890
27	RUBY	CAMP	NULATO	840
27	RUBY	DUNCAN	RUBY	954
27	RUBY	FLAT	RUBY	872
27	RUBY	FOURTH OF JULY	RUBY	879
27	RUBY	GLEN GULCH	RUBY	900
27	RUBY	GRANITE	RUBY	929
27	RUBY	GREENSTORE	RUBY	891
27	RUBY	LONG	RUBY	913
27	RUBY	MIDNIGHT	RUBY	871
27	RUBY	MONUMENT	RUBY	908
27	RUBY	MOOSE	RUBY	928
27	RUBY	MEKETCHUM	RUBY	901
27	RUBY	OPHIR	RUBY	831
27	RUBY	POORMAN	RUBY	918
27	RUBY	RUBY	RUBY	907
27	RUBY	SHORT	RUBY	901
27	RUBY	SOLOMON	RUBY	988
27	RUBY	SPRUCE	RUBY	883
27	RUBY	STRAIGHT	RUBY	901
27	RUBY	SWIFT	RUBY	908
27	RUBY	TAMARACK	RUBY	872
27	RUBY	TENDERFOOT	RUBY	899
27	RUBY	TIMBER	RUBY	814
27	RUBY	TRAIL	RUBY	798
27	RUBY	WILLOW	RUBY	872
28	TOLOVANA	AMY	LIVENGOOD	918
28	TOLOVANA	GERTRUDE	LIVENGOOD	920
28	TOLOVANA	LILLIAN	LIVENGOOD	926
28	TOLOVANA	LIVENGOOD	LIVENGOOD	934
28	TOLOVANA	LUCKY	LIVENGOOD	911

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
28	TOLOVANA	MYRTLE	LIVENGOOD	933
28	TOLOVANA	OLIVE	LIVENGOOD	907
28	TOLOVANA	RUTH	LIVENGOOD	866
28	TOLOVANA	WILBUR	LIVENGOOD	818
29	MCKINLEY	BIRCH GULCH	MEDFRA	917
29	MCKINLEY	CANDLE	MCGRATH	902
29	MCKINLEY	CRIPPLE	OPHIR	907
29	MCKINLEY	EAGLE	MCGRATH	900
29	MCKINLEY	HIDDEN	MEDFRA	900
29	MCKINLEY	HOLMES	MEDFRA	900
29	MCKINLEY	MOORE	IDITAROD	883
30	GEORGETOWN	CROOKED	IDITAROD	919
30	GEORGETOWN	DONLIN	IDITAROD	972
30	GEORGETOWN	JULIAN	IDITAROD	857
31	TULUKSAK-ANIAK	BEAR	RUSSIAN MISSION	931
31	TULUKSAK-ANIAK	BONANZA	RUSSIAN MISSION	893
31	TULUKSAK-ANIAK	CANYON	BETHEL	896
31	TULUKSAK-ANIAK	CRIPPLE	BETHEL	875
31	TULUKSAK-ANIAK	DOME	BETHEL	853
31	TULUKSAK-ANIAK	FOURTY-SEVEN	SLEETMUTE	814
31	TULUKSAK-ANIAK	GRANITE	BETHEL	920
31	TULUKSAK-ANIAK	MARVEL	BETHEL	888
31	TULUKSAK-ANIAK	MARY LOU GULCH	BETHEL	901
31	TULUKSAK-ANIAK	TAYLOR	TAYLOR MTS	830
31	TULUKSAK-ANIAK	TINY	RUSSIAN MISSION	903
31	TULUKSAK-ANIAK	TULUKSAK	RUSSIAN MISSION	922
32	GOODNEWS BAY	BUTTE	GOODNEWS BAY	898
32	GOODNEWS BAY	FOX GULCH	GOODNEWS BAY	878
32	GOODNEWS BAY	KOWKOW	GOODNEWS BAY	900
32	GOODNEWS BAY	RAINEY	GOODNEWS BAY	884
32	GOODNEWS BAY	SLATE	GOODNEWS BAY	877
32	GOODNEWS BAY	WATTAMUSE	GOODNEWS BAY	861
33	BLUFF	CALIFORNIA	SOLOMON	897
33	BLUFF	DANIELS	SOLOMON	921
33	BLUFF	SWEDE	SOLOMON	899
34	COUNCIL	AGGIE	SOLOMON	969
34	COUNCIL	ALBION	BENDELEBEN	916
34	COUNCIL	CROOKED	BENDELEBEN	900
34	COUNCIL	DUTCH	SOLOMON	902
34	COUNCIL	ELKHORN	SOLOMON	908
34	COUNCIL	GOLD BOTTOM	SOLOMON	899
34	COUNCIL	MELSING	SOLOMON	932
34	COUNCIL	MISTERY	SOLOMON	937
34	COUNCIL	MYSTERY	SOLOMON	966
34	COUNCIL	NIUKLUK	SOLOMON	838
34	COUNCIL	OPHIR	SOLOMON	995
34	COUNCIL	OTTER	BENDELEBEN	920
34	COUNCIL	SWEETCAKE	SOLOMON	842
34	COUNCIL	WARM	SOLOMON	908
34	COUNCIL	WILLOW	SOLOMON	889
35	FAIRHAVEN	BEAR	CANDLE	905
35	FAIRHAVEN	CANDLE	CANDLE	885
35	FAIRHAVEN	CUNNINGHAM	BENDELEBEN	895
35	FAIRHAVEN	DISCOVERY GULCH	BENDELEBEN	900

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
35	FAIRHAVEN	GLACIER	BENDELEBEN	885
35	FAIRHAVEN	GOLD RUN	CANDLE	885
35	FAIRHAVEN	HANNUM	BENDELEBEN	901
35	FAIRHAVEN	INMACHUCK	BENDELEBEN	905
35	FAIRHAVEN	JUMP	CANDLE	852
35	FAIRHAVEN	LAST CHANCE	CANDLE	917
35	FAIRHAVEN	KOOPUK	CANDLE	917
35	FAIRHAVEN	KUGRUK RIVER	BENDELEBEN	922
35	FAIRHAVEN	MUD	CANDLE	869
35	FAIRHAVEN	OLD GLORY	BENDELEBEN	908
35	FAIRHAVEN	PATTERSON	BENDELEBEN	910
36	KOUGAROK	ATLAS	BENDELEBEN	900
36	KOUGAROK	BENSON	SOLOMON	881
36	KOUGAROK	BLACK GULCH	BENDELEBEN	900
36	KOUGAROK	BOULDER	BENDELEBEN	891
36	KOUGAROK	BUZZARD GULCH	BENDELEBEN	899
36	KOUGAROK	COFFEE	BENDELEBEN	857
36	KOUGAROK	DAHL	BENDELEBEN	899
36	KOUGAROK	DICK	BENDELEBEN	903
36	KOUGAROK	DOME	BENDELEBEN	893
36	KOUGAROK	GARFIELD	BENDELEBEN	901
36	KOUGAROK	GROUSE	BENDELEBEN	934
36	KOUGAROK	HARRIS	BENDELEBEN	965
36	KOUGAROK	HUMBOLT	BENDELEBEN	850
36	KOUGAROK	INDIAN	BENDELEBEN	901
36	KOUGAROK	IRON	SOLOMON	907
36	KOUGAROK	KOUGAROK	BENDELEBEN	908
36	KOUGAROK	MACKLIN	BENDELEBEN	965
36	KOUGAROK	MASCOT GULCH	BENDELEBEN	914
36	KOUGAROK	NORTH FORK KOUGAROK	BENDELEBEN	903
36	KOUGAROK	NOXAPAGA	BENDELEBEN	909
36	KOUGAROK	QUARTZ	BENDELEBEN	899
36	KOUGAROK	TAYLOR	BENDELEBEN	920
36	KOUGAROK	TRINITY	BENDELEBEN	938
36	KOUGAROK	WINDY	BENDELEBEN	909
36	KOUGAROK	WONDER GULCH	BENDELEBEN	951
37	KOYUK	BEAR	CANDLE	910
37	KOYUK	BONANZA	NORTON BAY	901
37	KOYUK	DIME	CANDLE	962
37	KOYUK	SWEEPSTAKE	CANDLE	855
37	KOYUK	UNGALIK	NORTON BAY	932
38	NOME	ANVIL	NOME	924
38	NOME	ARCTIC	NOME	899
38	NOME	BANGOR	NOME	900
38	NOME	BANNER	NOME	887
38	NOME	BASIN	NOME	918
38	NOME	BEACH	NOME	918
38	NOME	BOULDER	NOME	920
38	NOME	BOURBON AND WONDER	NOME	983
38	NOME	BUSTER	NOME	908
38	NOME	CENTER	NOME	910
38	NOME	CHRISTIAN	NOME	830
38	NOME	CLARA	NOME	917
38	NOME	COOPER GULCH	NOME	910

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
38	NOME	DARLING	NOME	872
38	NOME	DERBY	NOME	910
38	NOME	DEXTER	NOME	921
38	NOME	DOROTHY	NOME	869
38	NOME	DRY	NOME	924
38	NOME	FLAT	NOME	954
38	NOME	GLACIER	NOME	900
38	NOME	GRASS GULCH	NOME	921
38	NOME	GRUB GULCH	NOME	907
38	NOME	HASTINGS	NOME	882
38	NOME	HOBSON	NOME	910
38	NOME	HOLYOKE	NOME	946
38	NOME	HUNGRY	NOME	896
38	NOME	IRENE	NOME	900
38	NOME	JESS	NOME	890
38	NOME	LAST CHANCE	NOME	908
38	NOME	LAURADA	NOME	885
38	NOME	LITTLE	NOME	967
38	NOME	MANILA	NOME	907
38	NOME	MONUMENT	NOME	904
38	NOME	NEKALA GULCH	NOME	904
38	NOME	NEWTON	NOME	923
38	NOME	NOME BEACH (2)	NOME	930
38	NOME	NOME BEACH (3)	NOME	910
38	NOME	NOME RIVER	NOME	912
38	NOME	NUGGET	NOME	938
38	NOME	OREGON	NOME	906
38	NOME	PELUK	NOME	898
38	NOME	PIONEER	NOME	917
38	NOME	PROSPECT	NOME	902
38	NOME	ROCK	NOME	910
38	NOME	ROCKY MT	NOME	810
38	NOME	ST MICHAELS	NOME	848
38	NOME	SAUNDERS	NOME	900
38	NOME	SHEPHERD	NOME	837
38	NOME	SNAKE	NOME	916
38	NOME	SPECIMEN GULCH	NOME	923
38	NOME	SUBMARINE BEACH	NOME	901
38	NOME	SUNSET	NOME	919
38	NOME	TWIN MT.	NOME	921
38	NOME	WASHINGTON	NOME	891
38	NOME	WONDER	NOME	955
39	PORT CLARENCE	ALDER	TELLER	875
39	PORT CLARENCE	BLUESTONE	TELLER	899
39	PORT CLARENCE	BUCK	TELLER	934
39	PORT CLARENCE	BUDD	TELLER	887
39	PORT CLARENCE	COYOTE	TELLER	900
39	PORT CLARENCE	DESE	TELLER	975
39	PORT CLARENCE	DICK	TELLER	917
39	PORT CLARENCE	GOLDRUN	TELLER	893
39	PORT CLARENCE	IGLOO	TELLER	897
39	PORT CLARENCE	MILLION	TELLER	911
39	PORT CLARENCE	SUNSET	TELLER	893
39	PORT CLARENCE	SWANSON	TELLER	912

NO.	DISTRICT	CREEK	QUADRANGLE	(AU/(AU+AG)) x 1000
39	PORT CLARENCE	WINDY	TELLER	901
40	SOLOMON	AMERICAN	SOLOMON	900
40	SOLOMON	BEAVER	SOLOMON	901
40	SOLOMON	BIG HURRAH	SOLOMON	955
40	SOLOMON	BUTTE	SOLOMON	906
40	SOLOMON	CASADEPAGA	SOLOMON	901
40	SOLOMON	GOOSE	SOLOMON	912
40	SOLOMON	KASSON	SOLOMON	899
40	SOLOMON	LITTLE HURRAH	SOLOMON	908
40	SOLOMON	LOWER WILLOW	SOLOMON	872
40	SOLOMON	MOONLIGHT	SOLOMON	900
40	SOLOMON	PAJARA	SOLOMON	909
40	SOLOMON	PENELOPE	SOLOMON	947
40	SOLOMON	PENNY	SOLOMON	902
40	SOLOMON	SHOVEL	SOLOMON	954
40	SOLOMON	SOLOMON	SOLOMON	924
40	SOLOMON	SPRUCE	SOLOMON	901
40	SOLOMON	WEST	SOLOMON	865
40	SOLOMON	WILLOW	SOLOMON	889
41	KOBUK	CALIFORNIA	SHUNGNAK	871
41	KOBUK	CANYON	BAIRD MTS	901
41	KOBUK	DAHL	SHUNGNAK	833
41	KOBUK	KLERY	BAIRD MTS	918
41	KOBUK	SHUNGNAK	AMBLER RIVER	899

TABLE 1a. Analysis of variance between and within mining districts.

Source	D.F.	Sum of Squares	Mean Squares	F Ratio
Between Groups	40	0.2969	0.0074	4.314
Within Groups	509	0.8759	0.0017	
TOTAL	549	1.1728		

Figure 2: GOLD FINENESS FOR NIZINI DISTRICT

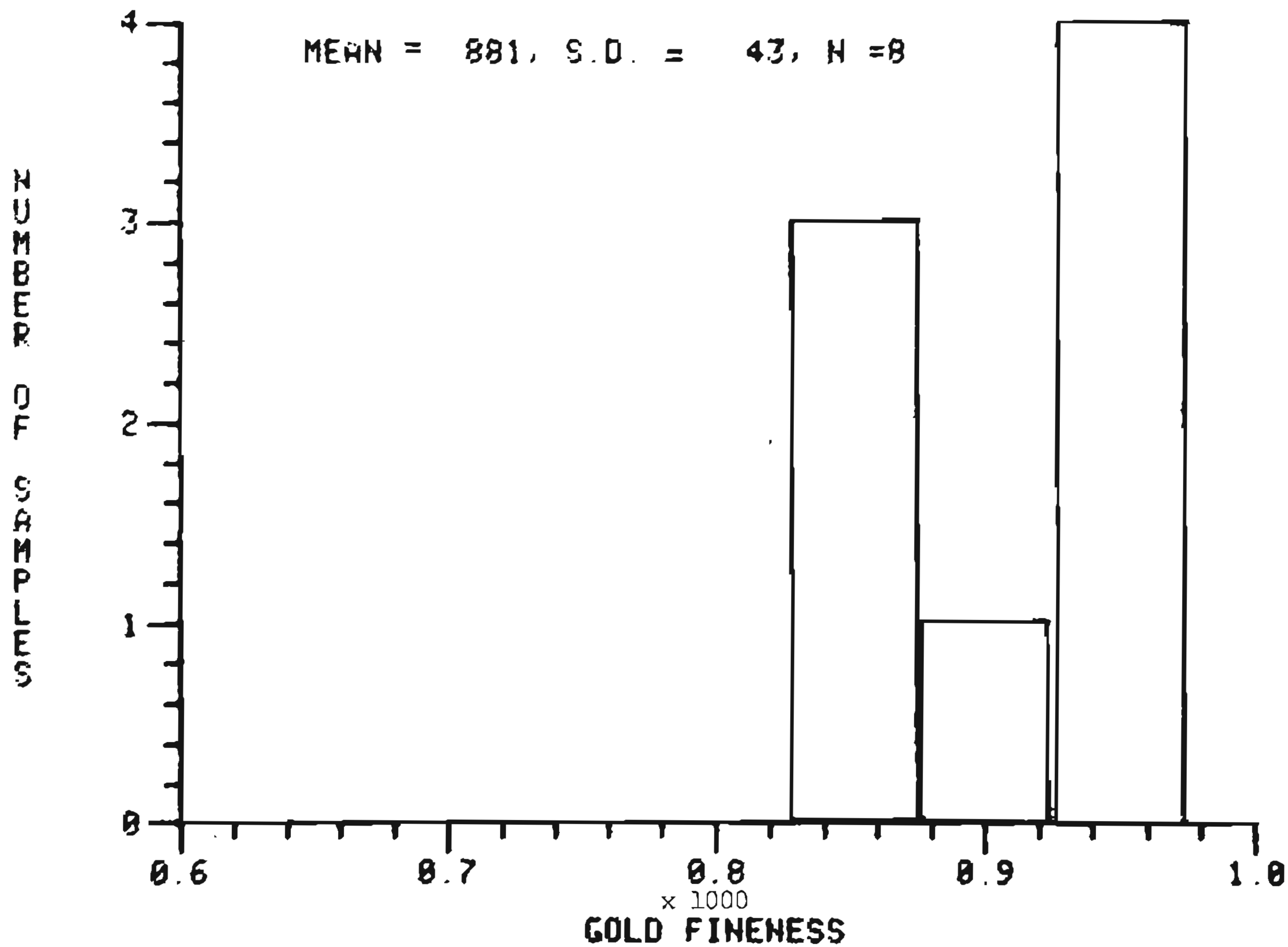

Figure 3: GOLD FINENESS FOR KENAI DISTRICT

MEAN= 907, S.D.= 20, N=9

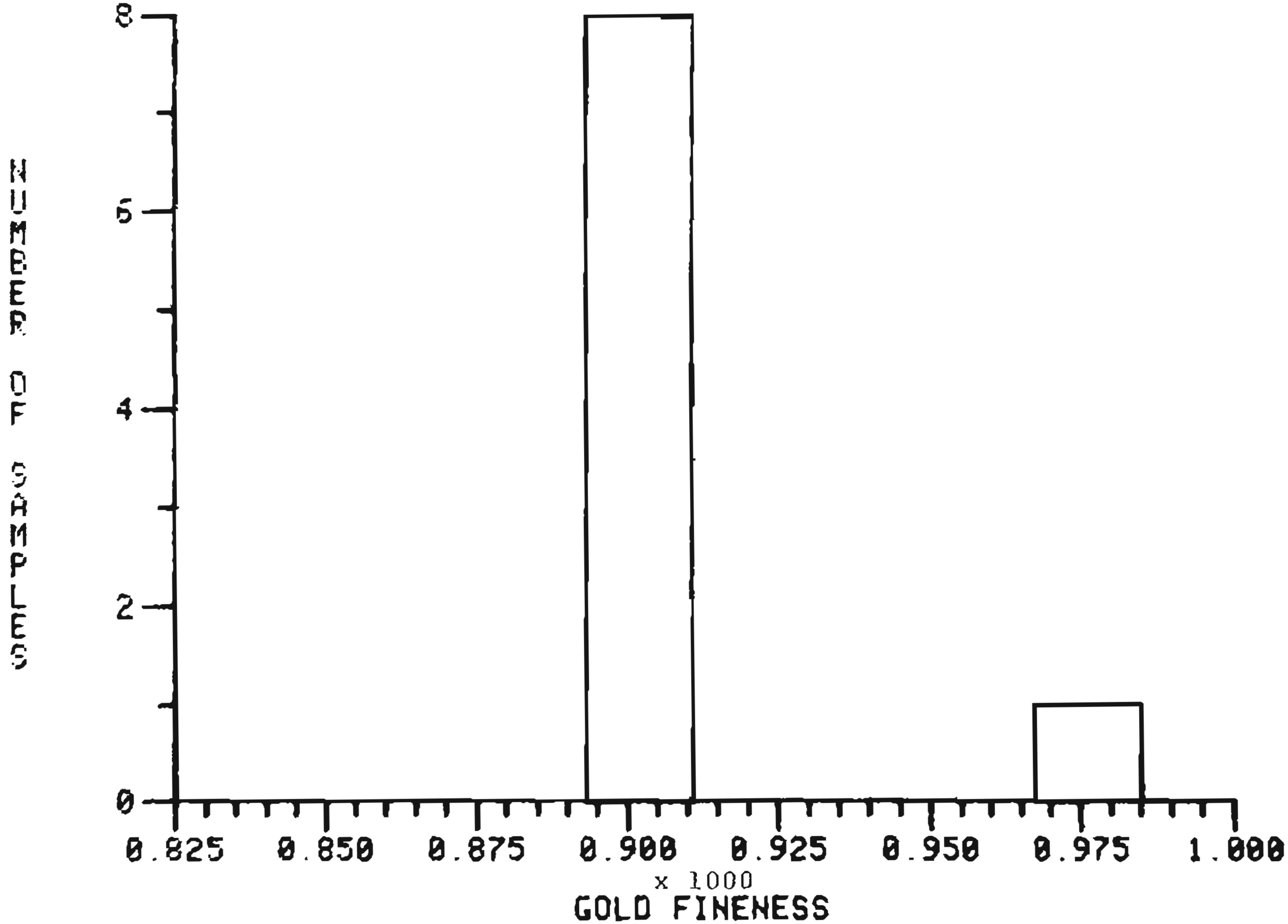

Figure 4: GOLD FINENESS FOR YENTNA DISTRICT

MEAN= 892. S.D.= 26. N= 24

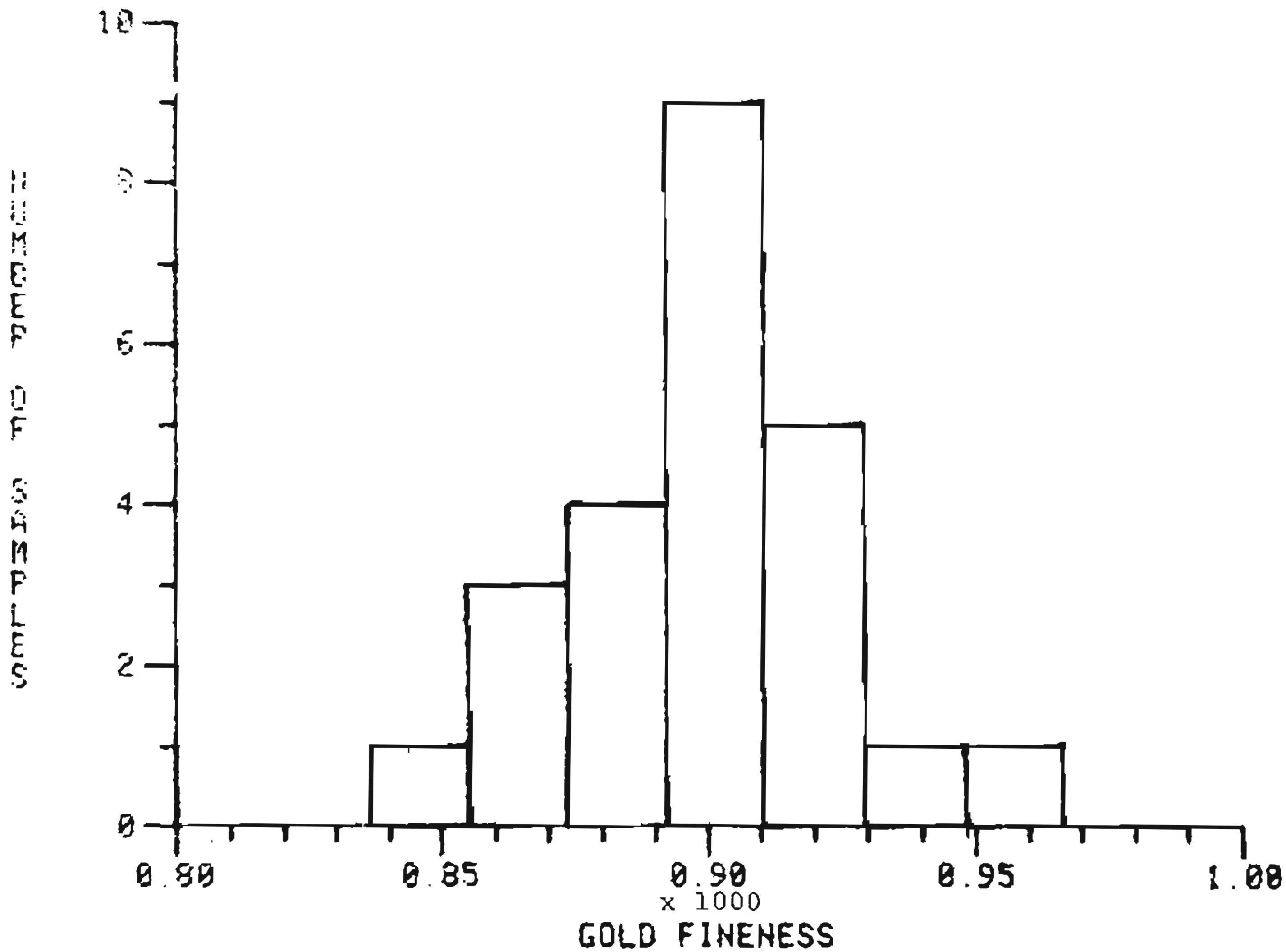

Figure 5: GOLD FINENESS FOR BONNIFIELD DISTRICT

MEAN= 863, S D.= 36, N=12

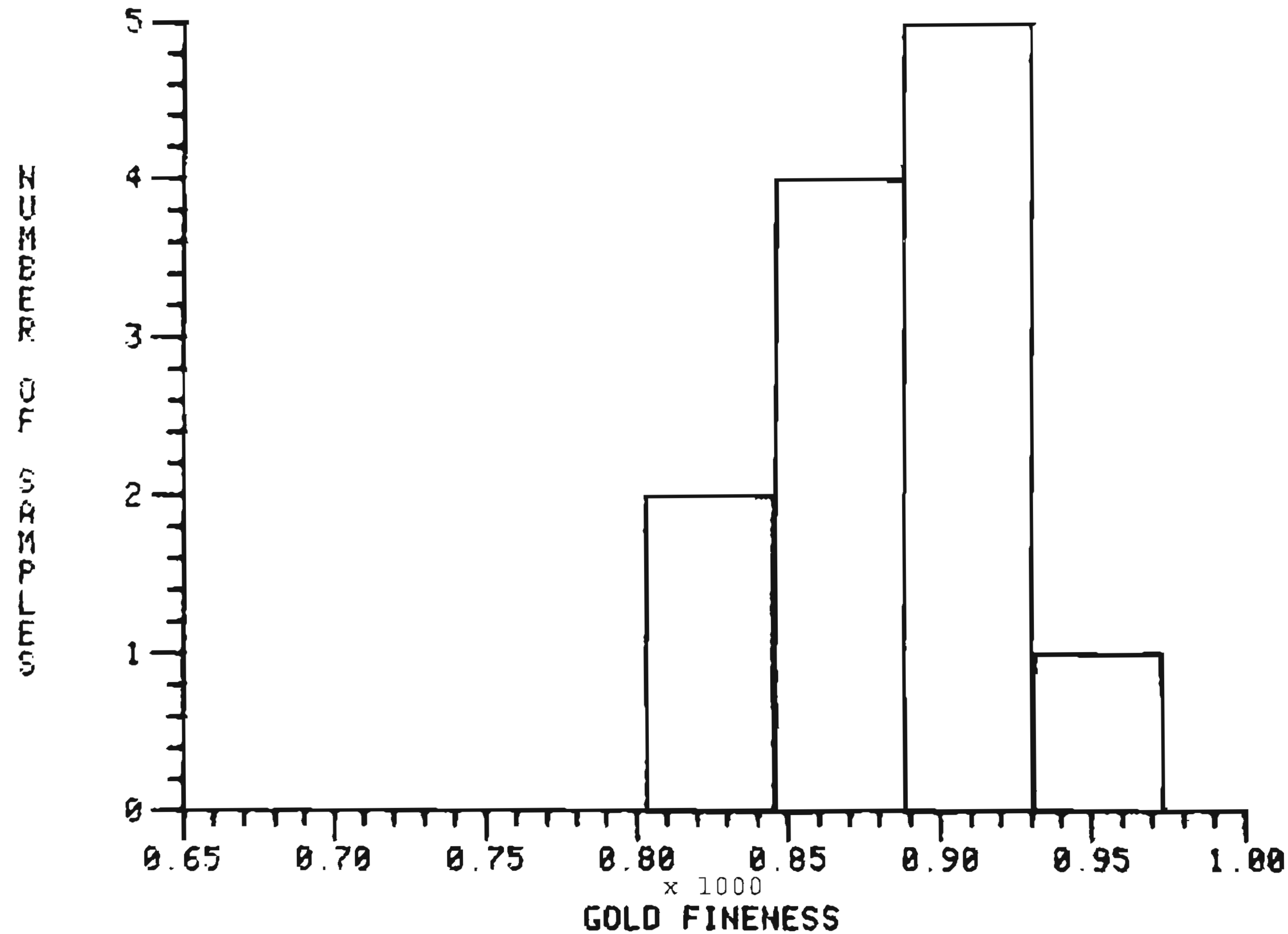

Figure 6: GOLD FINENESS FOR CIRCLE DISTRICT

MEAN= 863, S.D.= 62, N= 30

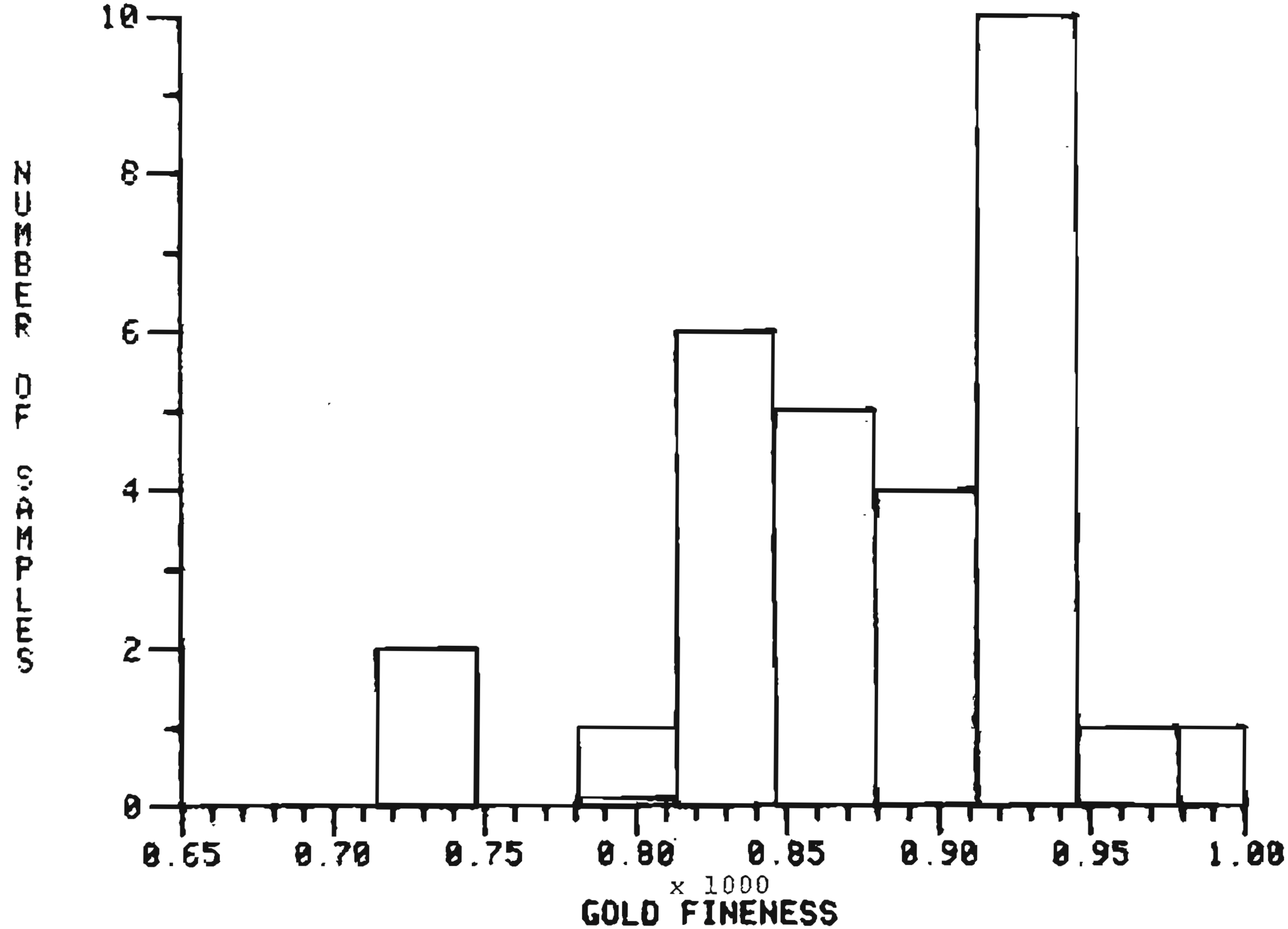

Figure 7: **GOLD FINENESS FOR EAGLE DISTRICT**

MEAN= 896, S.D.= 28, N= 11

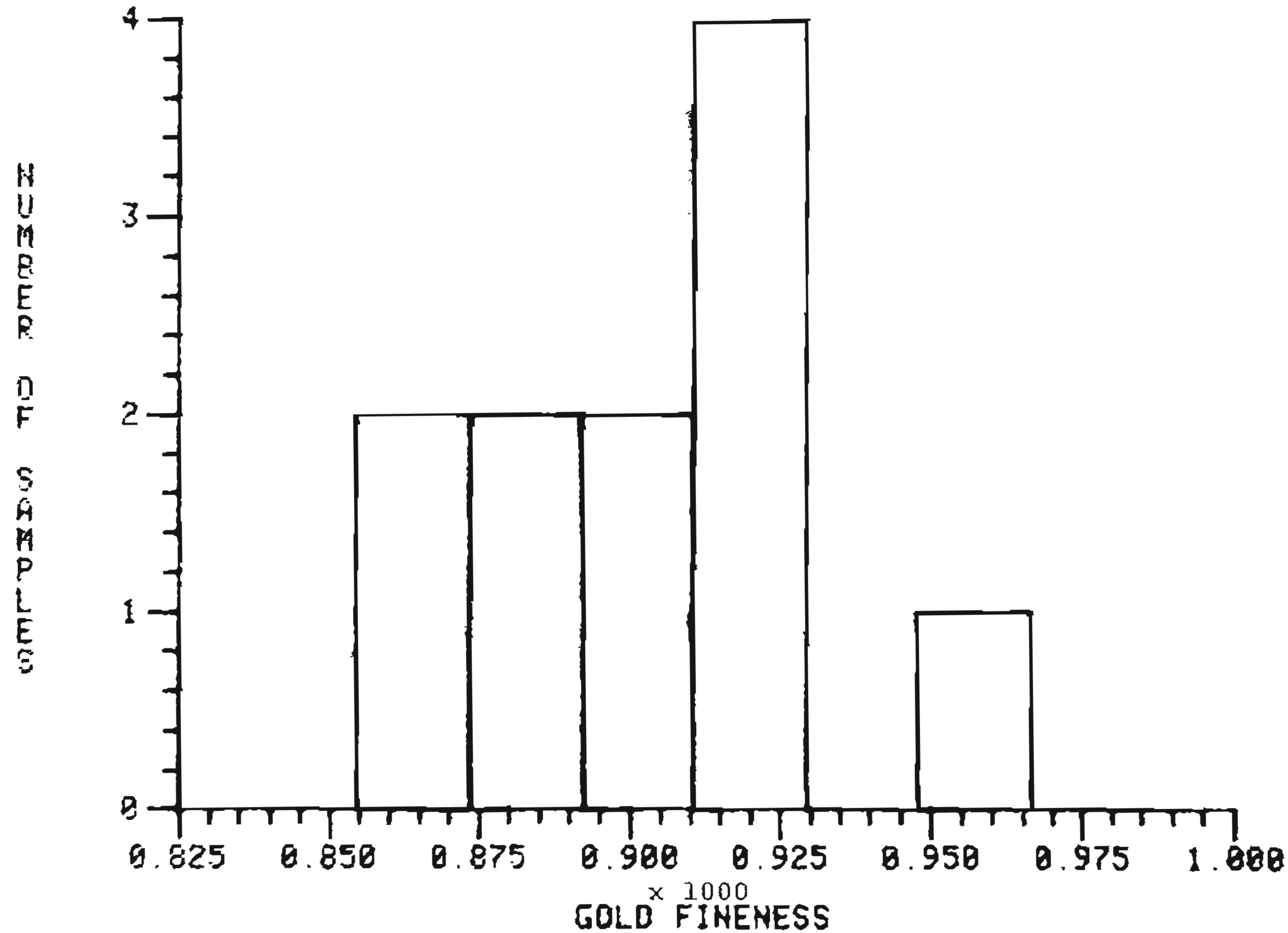

Figure 8: GOLD FINENESS FOR FAIRBANKS DISTRICT

MEAN= 894, S.D.= 28, N= 40

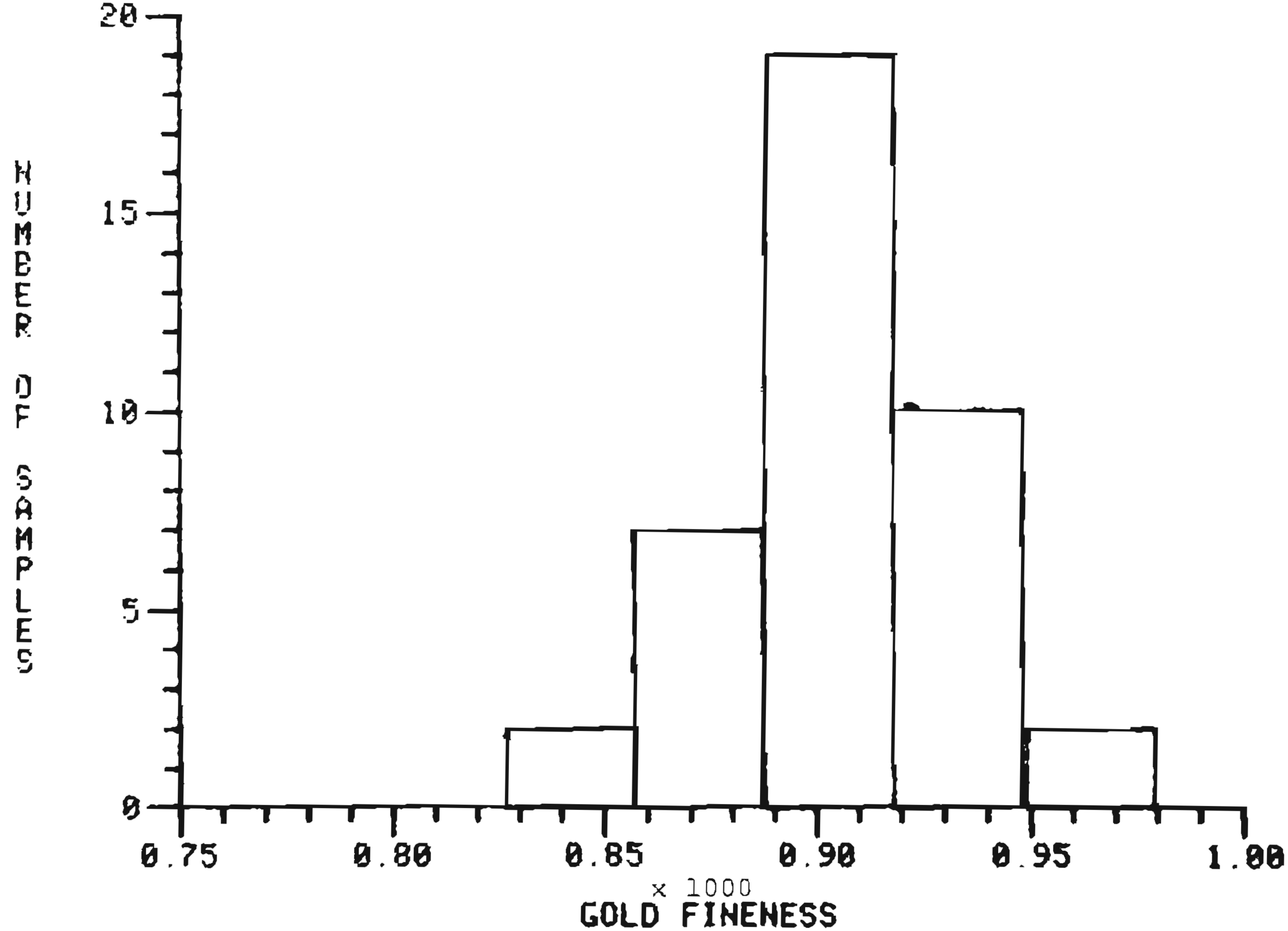

Figure 9: GOLD FINENESS FOR FORTYMILE DISTRICT

MEAN= 867, S.D.= 32, N= 29

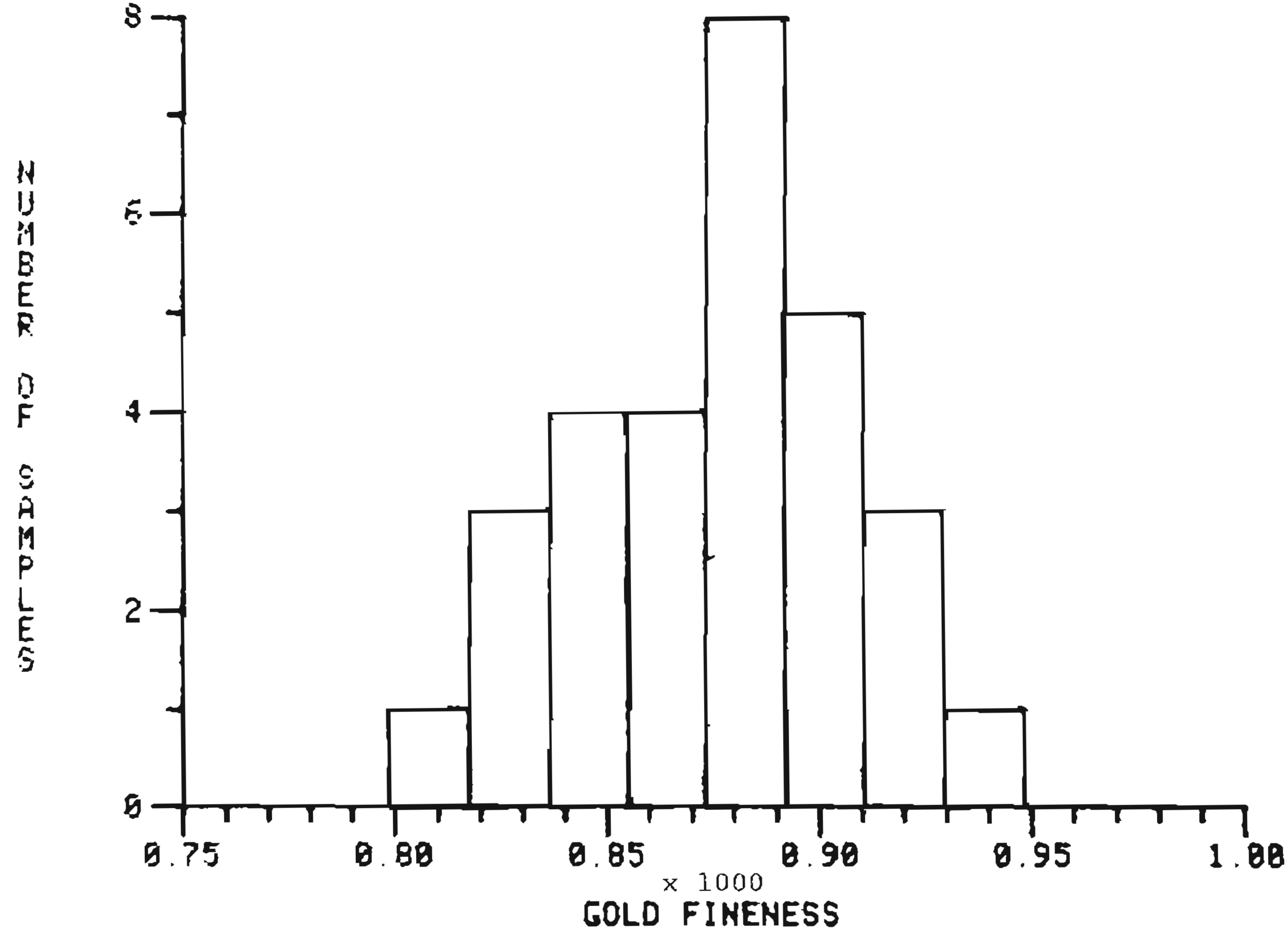

Figure 10: GOLD FINENESS FOR HOT SPRINGS DISTRICT

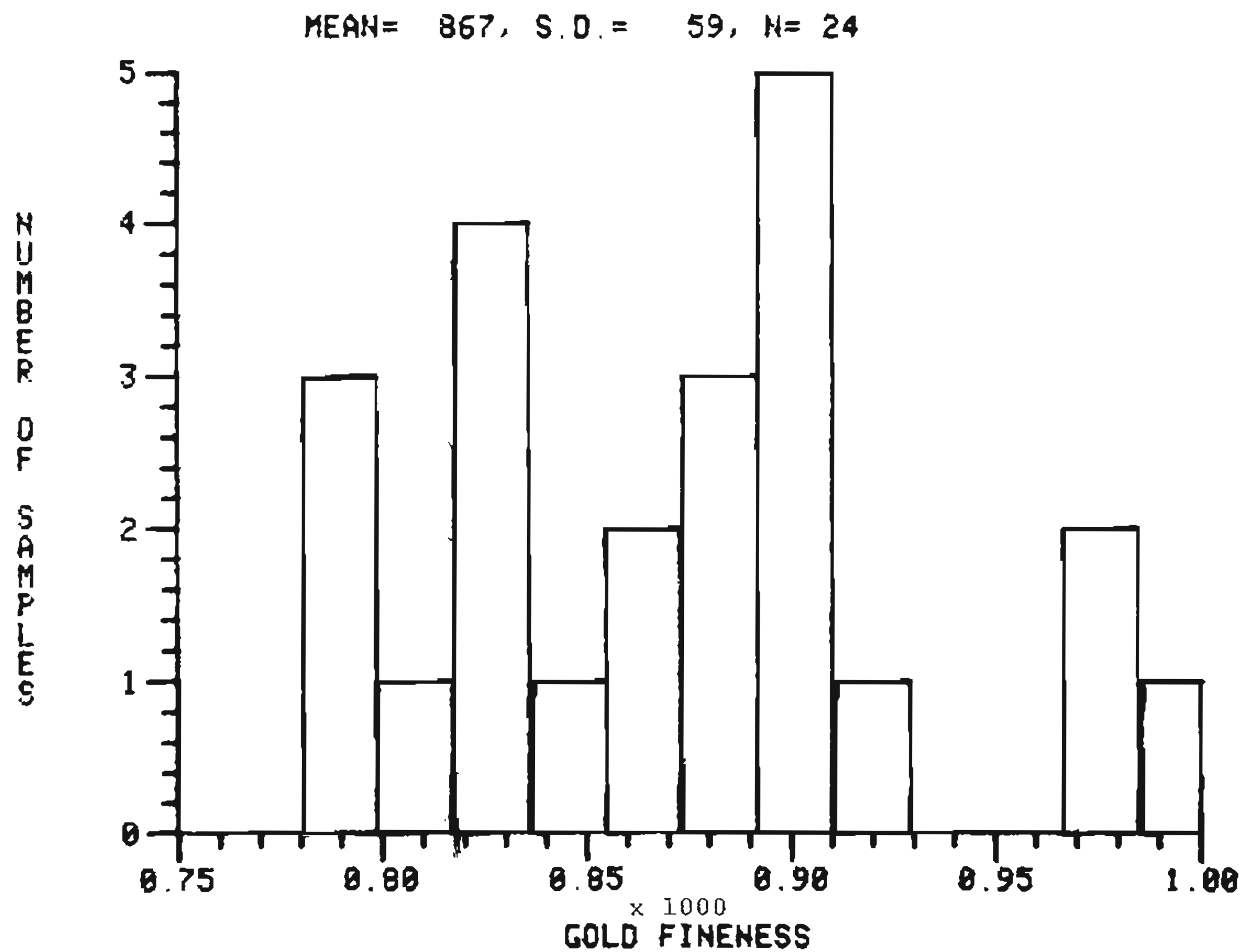

Figure 11: GOLD FINENESS FOR IDITAROD DISTRICT

MEAN= 897, S.D = 31, N= 19

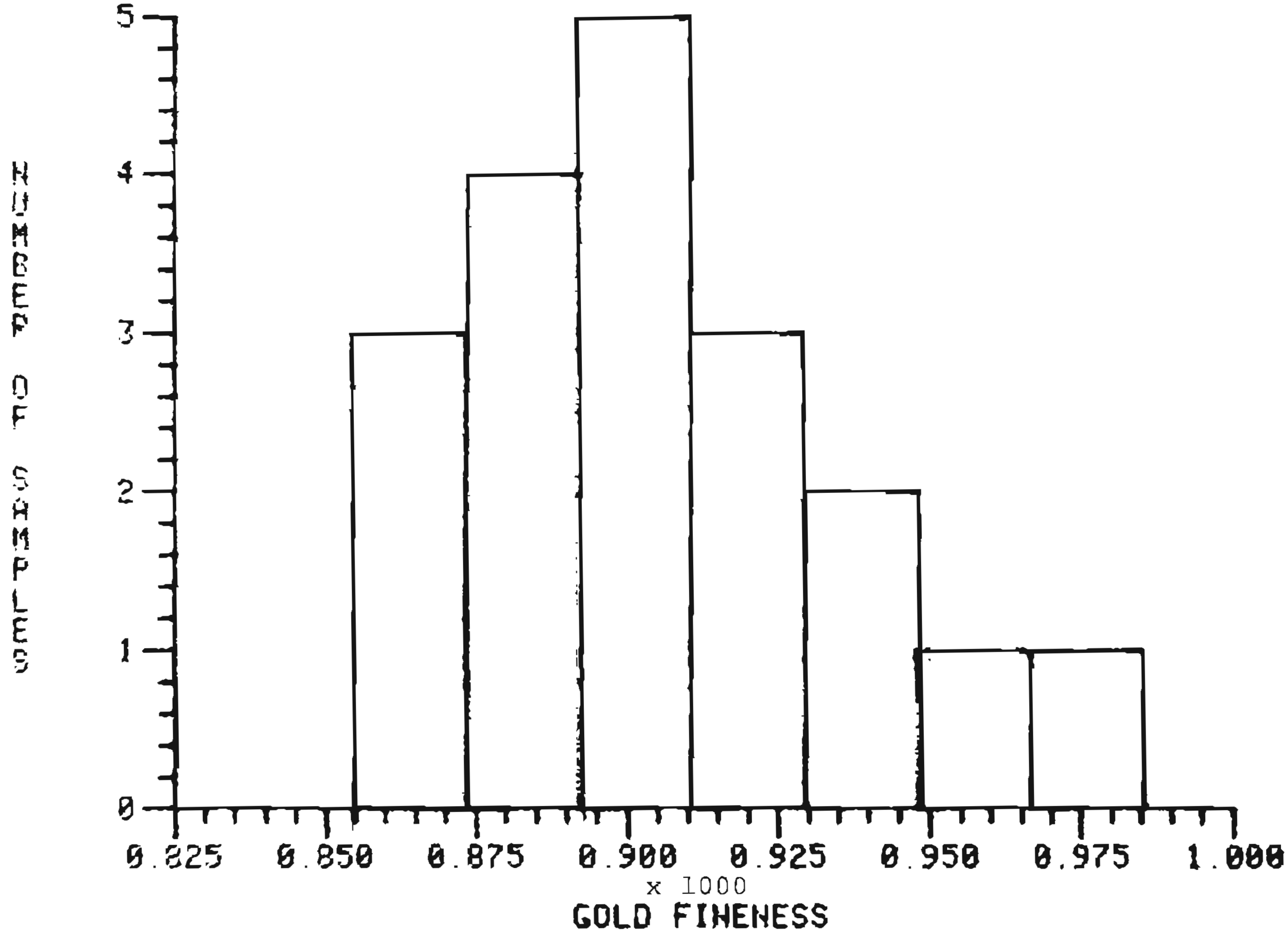

Figure 12: GOLD FINENESS FOR INNOKO DISTRICT

MEAN= 883, S.D.= 31, N= 20

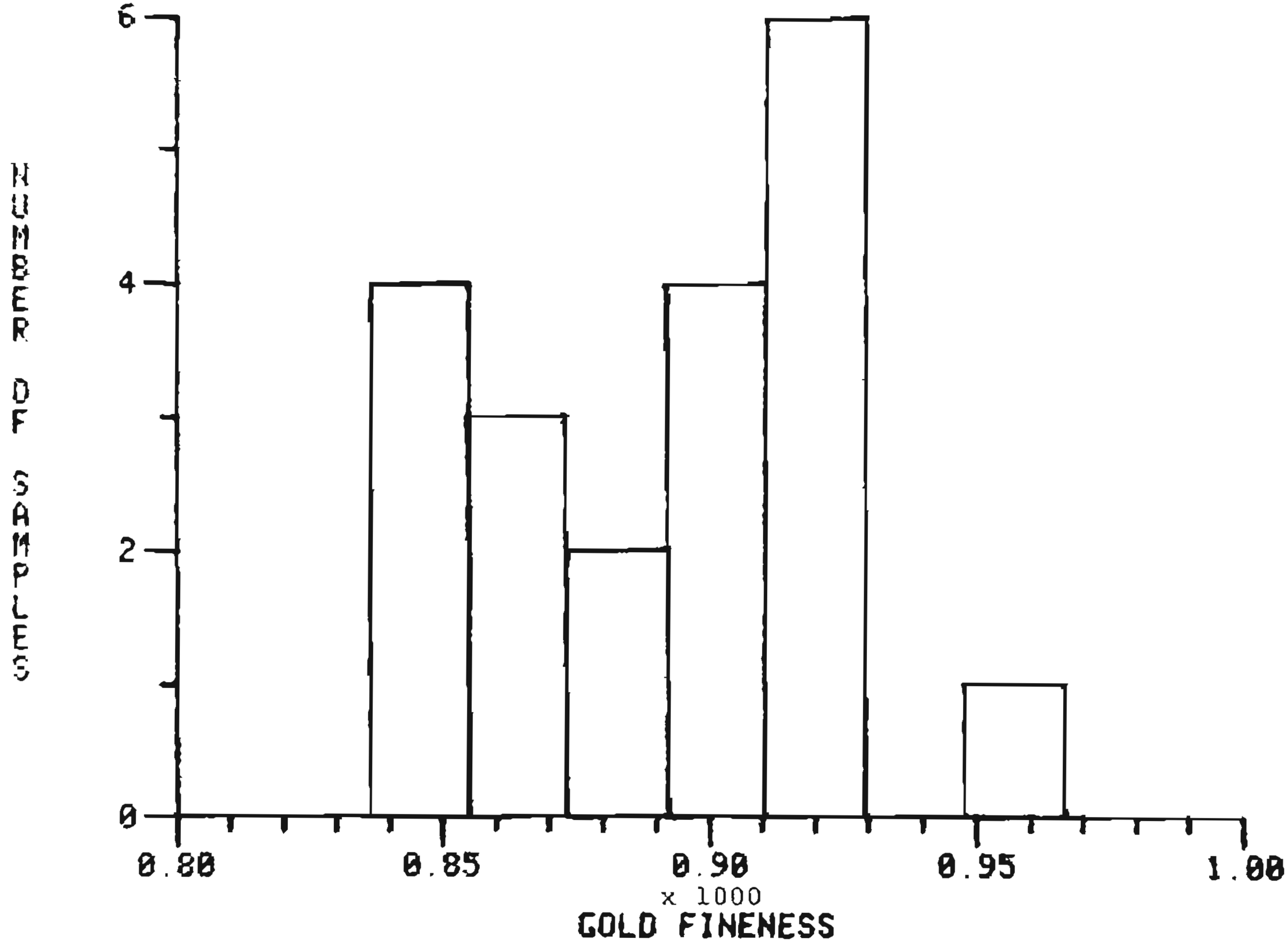

Figure 13: **GOLD FINENESS FOR KANTISHNA DISTRICT**

MEAN= 789, S.D = 126, N= 11

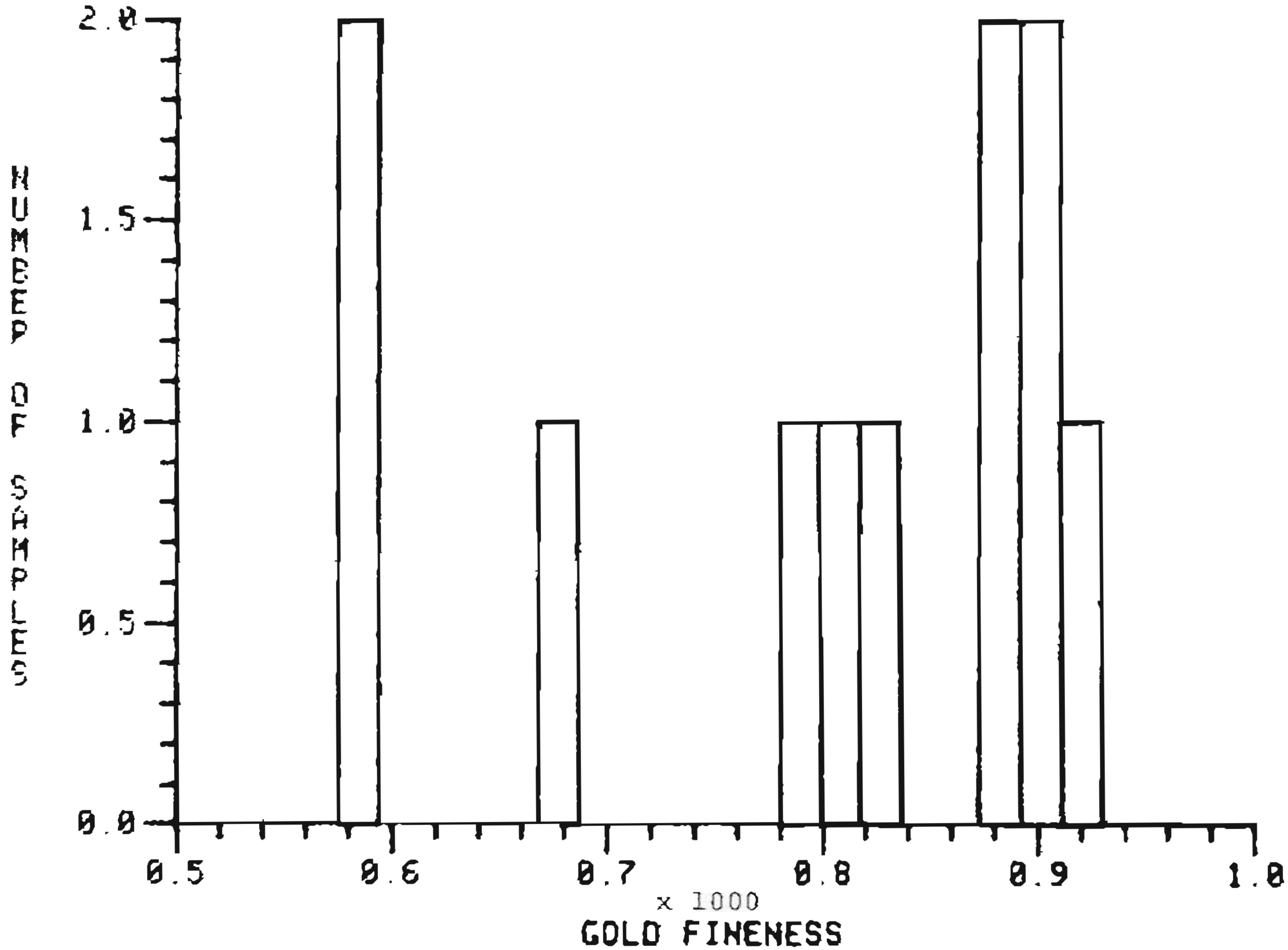

Figure 14: GOLD FINENESS FOR KOYUKUK DISTRICT

MEAN= 914, S.D.= 44, N=35

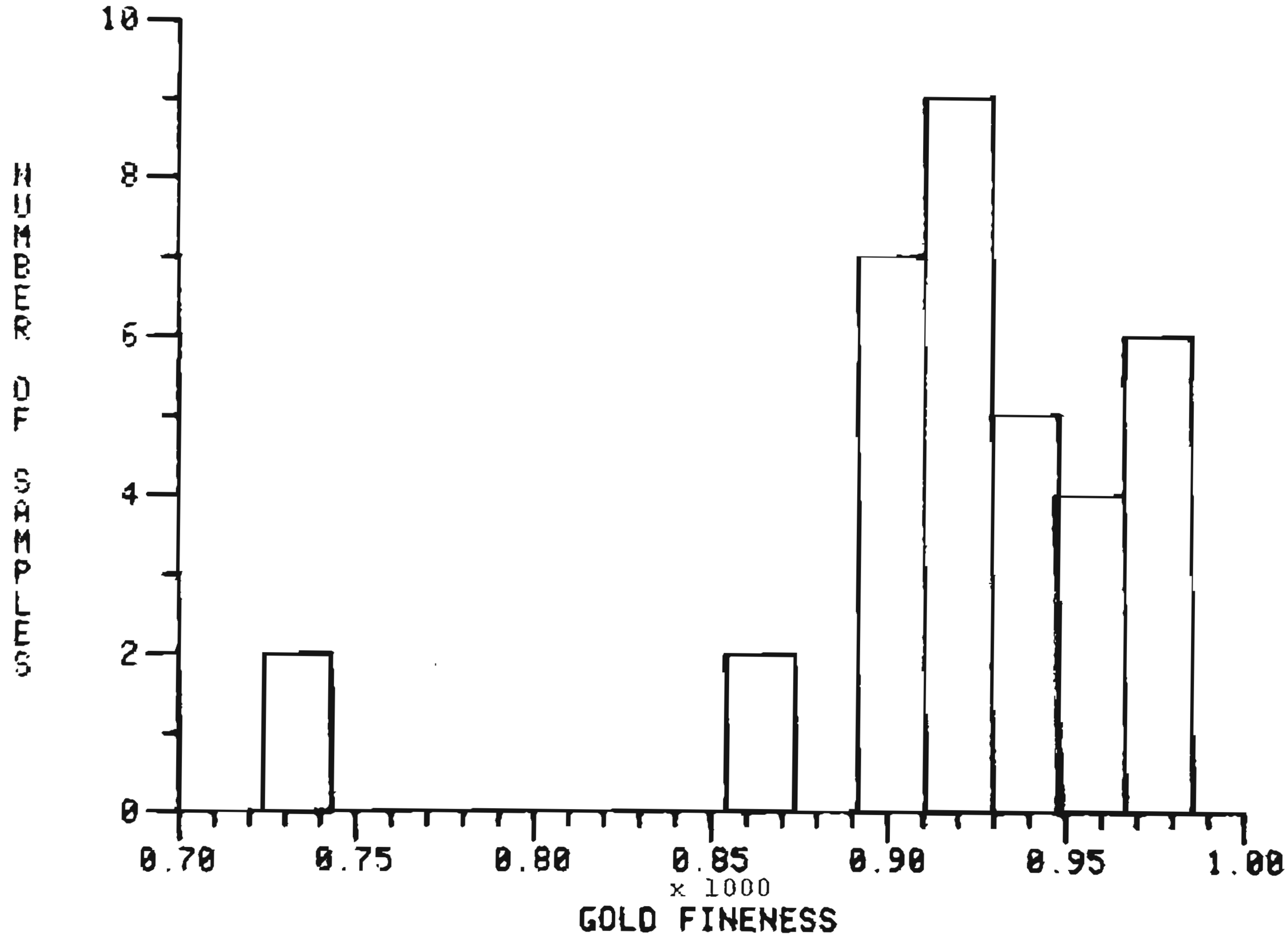

Figure 15: GOLD FINENESS FOR MARSHALL DISTRICT

MEAN= 870, S.D.= 48, N= 10

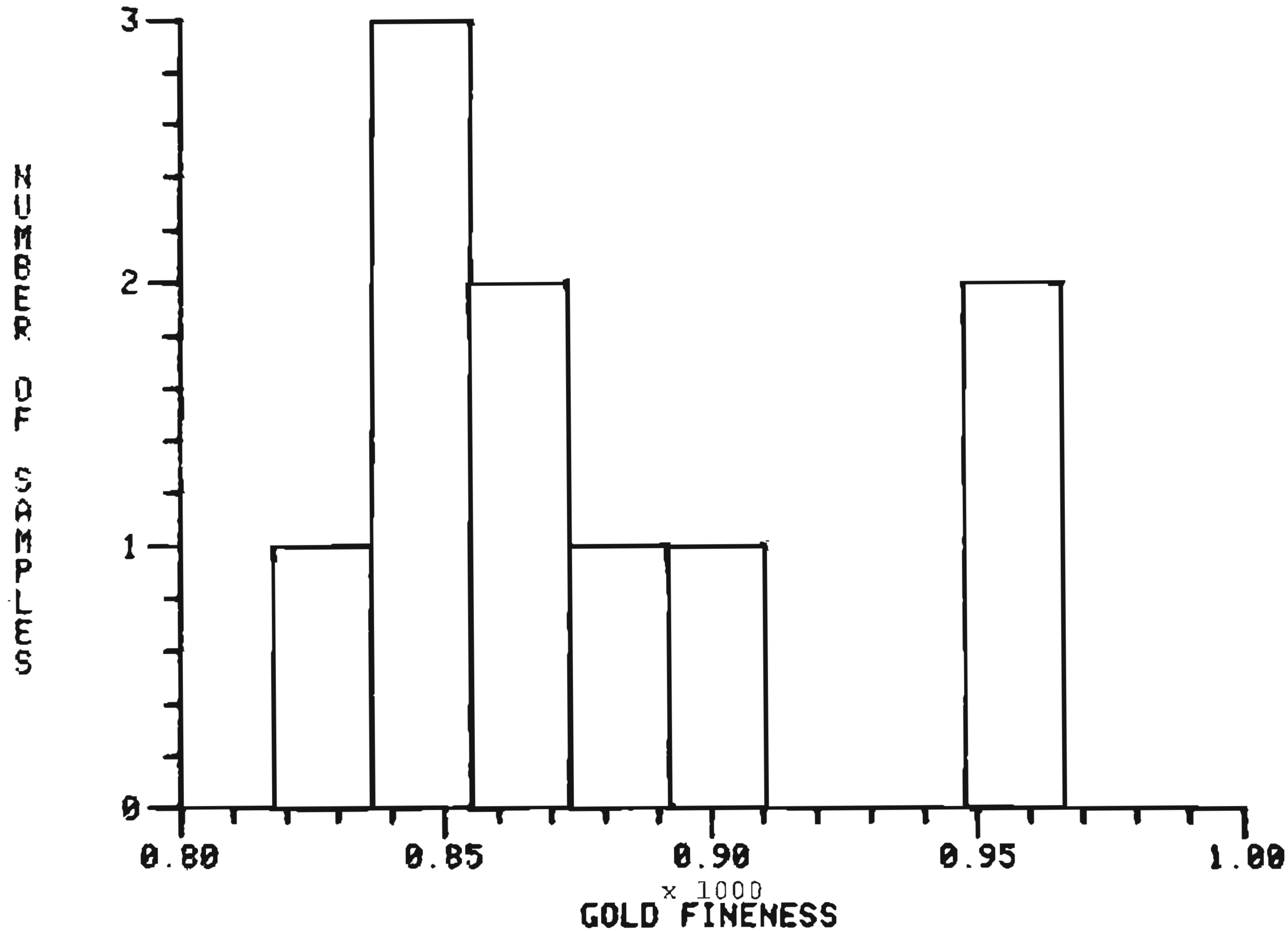

Figure 16: GOLD FINENESS FOR RAMPART DISTRICT

MEAN= 915, S.D.= 27, N= 12

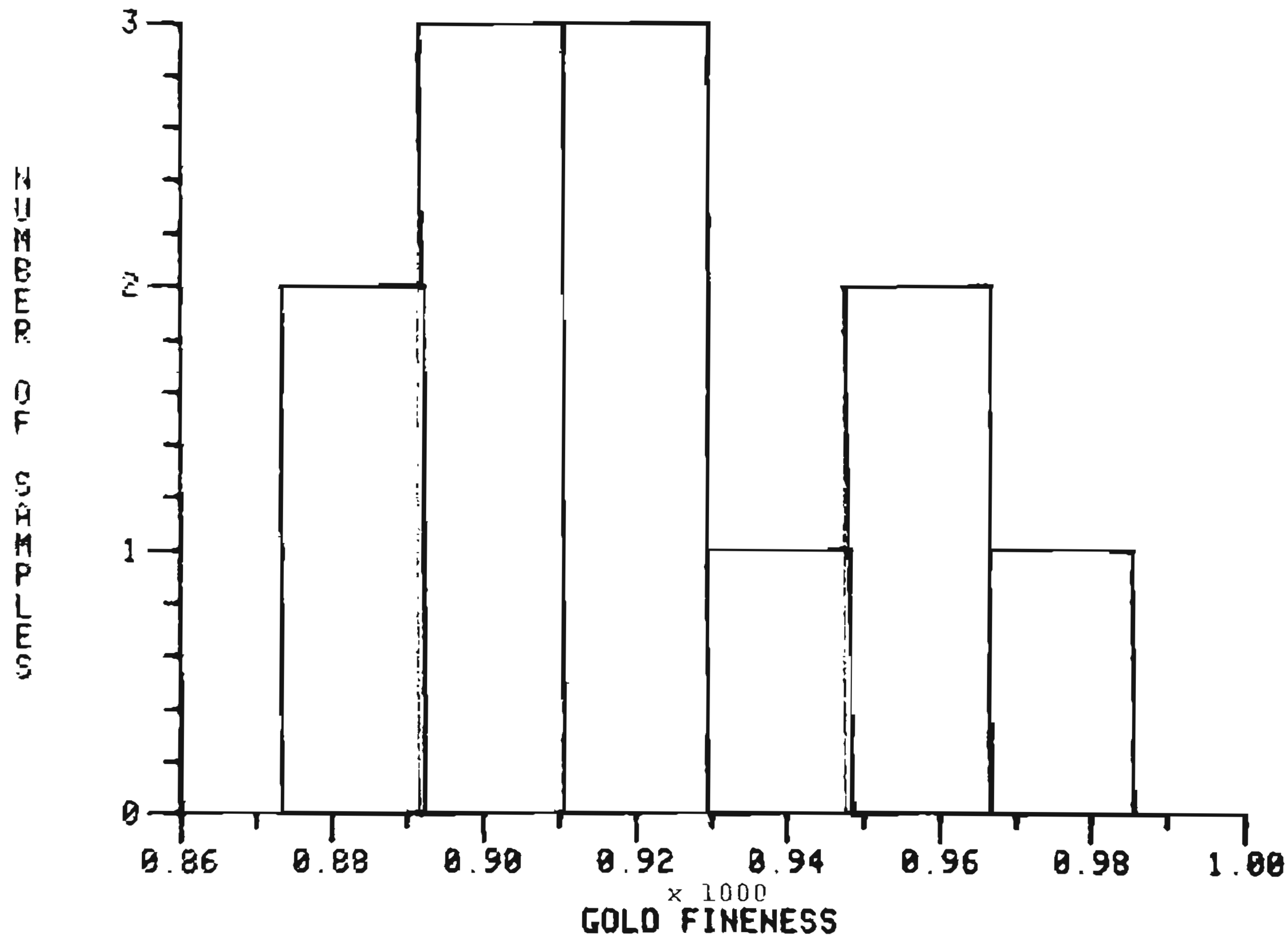

Figure 17: GOLD FINENESS FOR RUBY DISTRICT

MEAN= 891, S.D.= 40, N=27

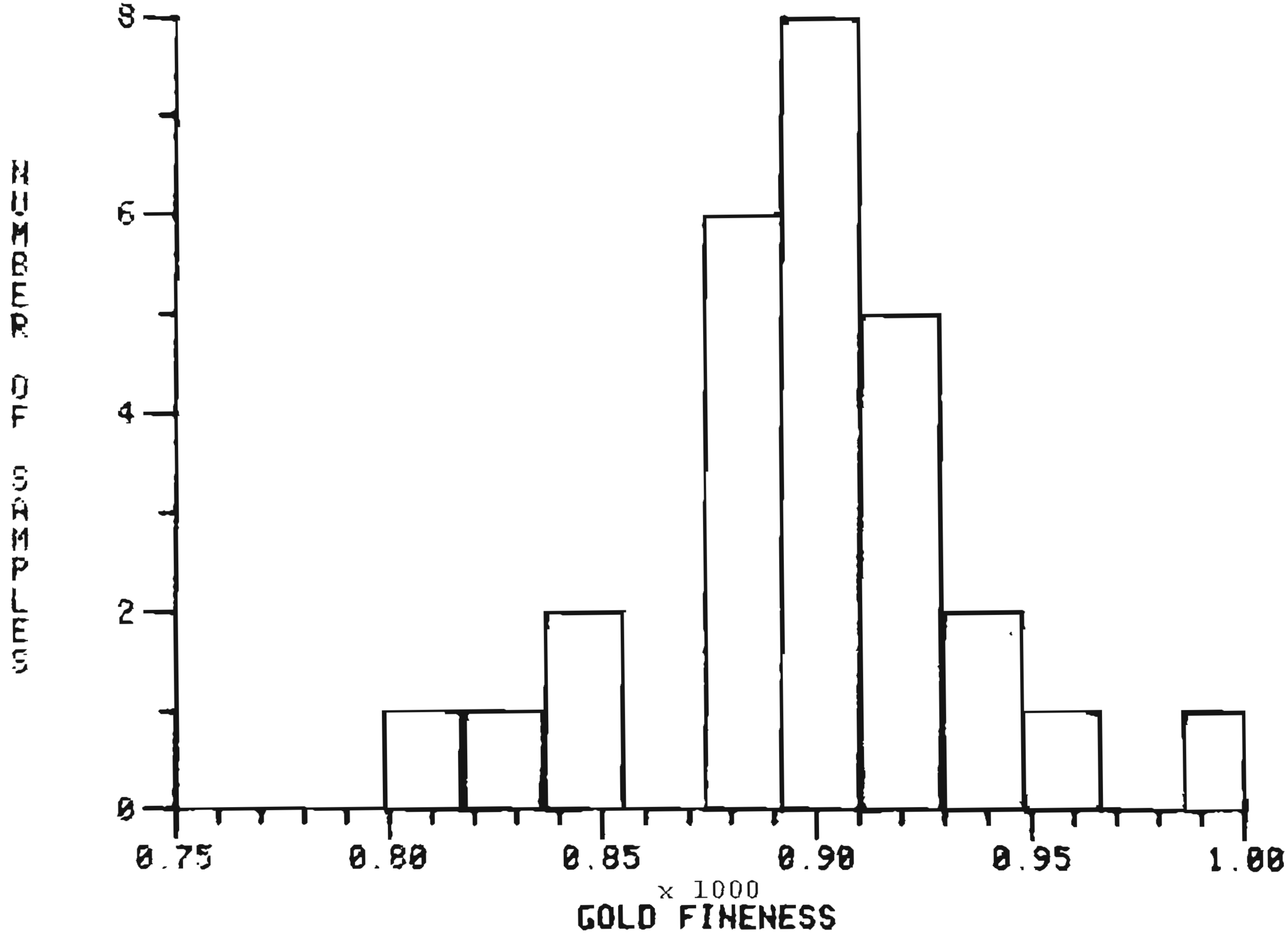

Figure 18: GOLD FINENESS FOR TOLOVANA DISTRICT

MEAN= 904, S.D.= 38, N= 9

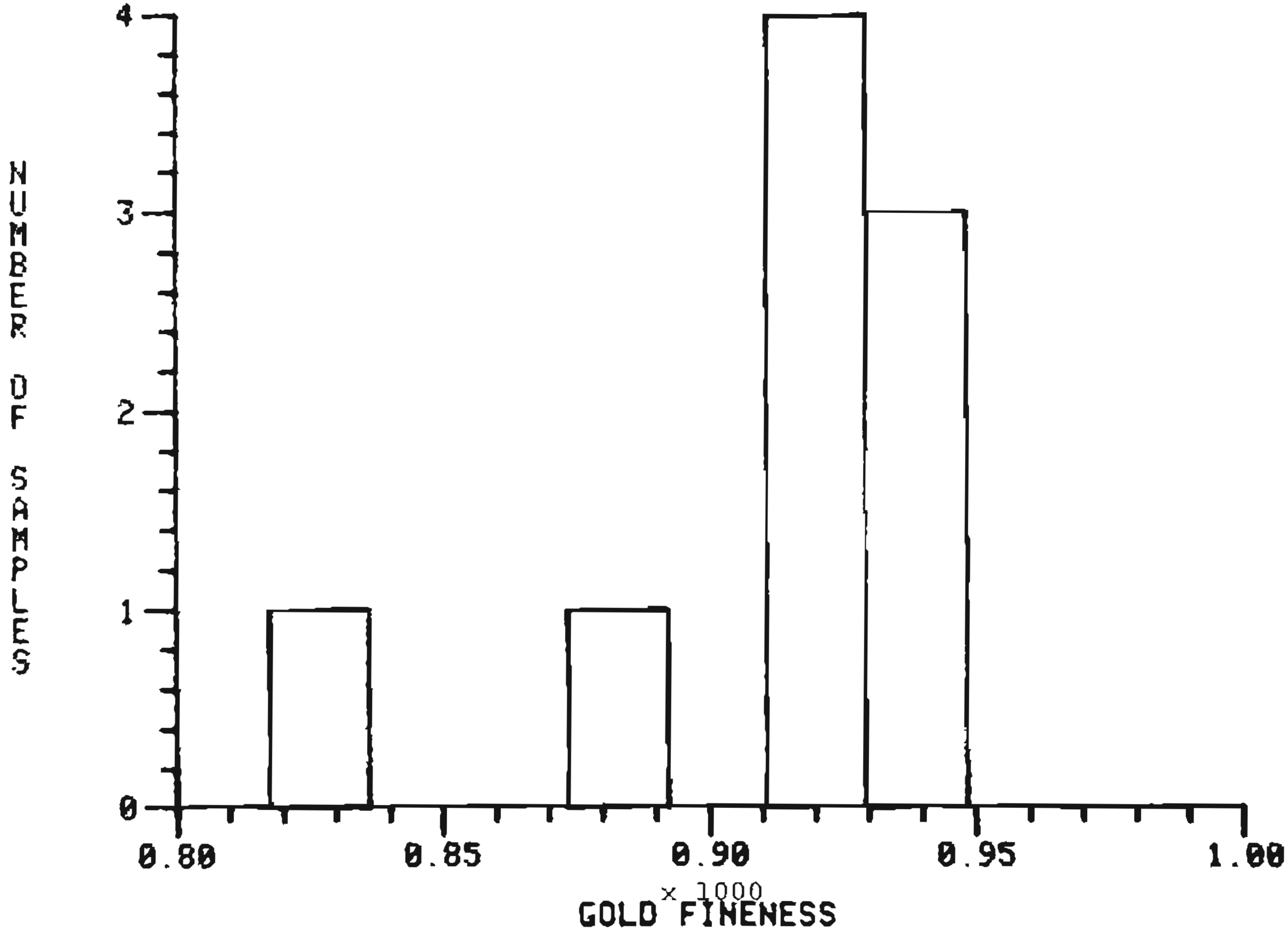

Figure 19: GOLD FINENESS FOR TULUKSAK-ANIANK DISTRICT

MEAN= 886, S.D.= 37, N= 12

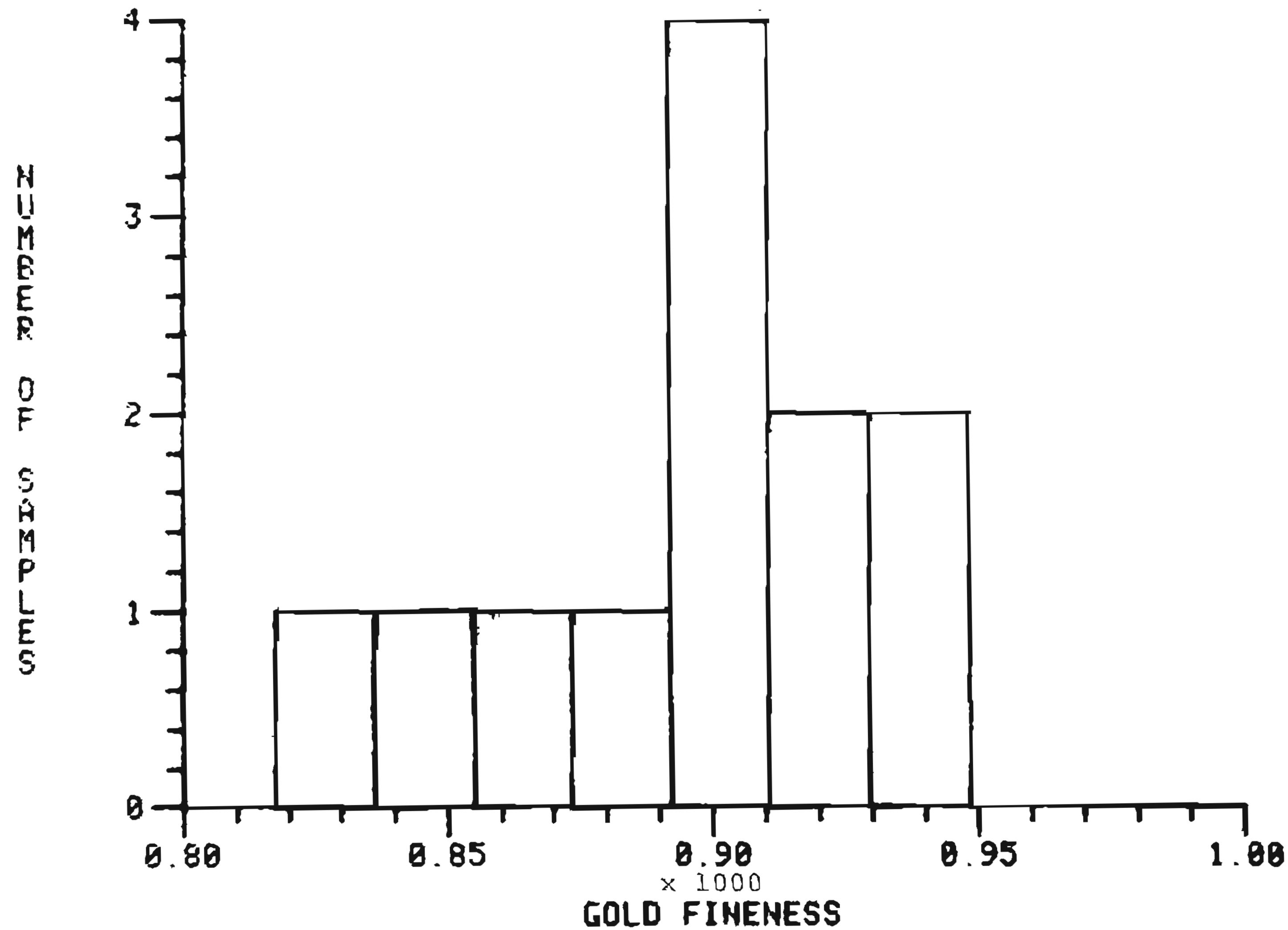

Figure 20: GOLD FINENESS FOR COUNCIL DISTRICT

MEAN= 915., S.D.= 43, N= 15

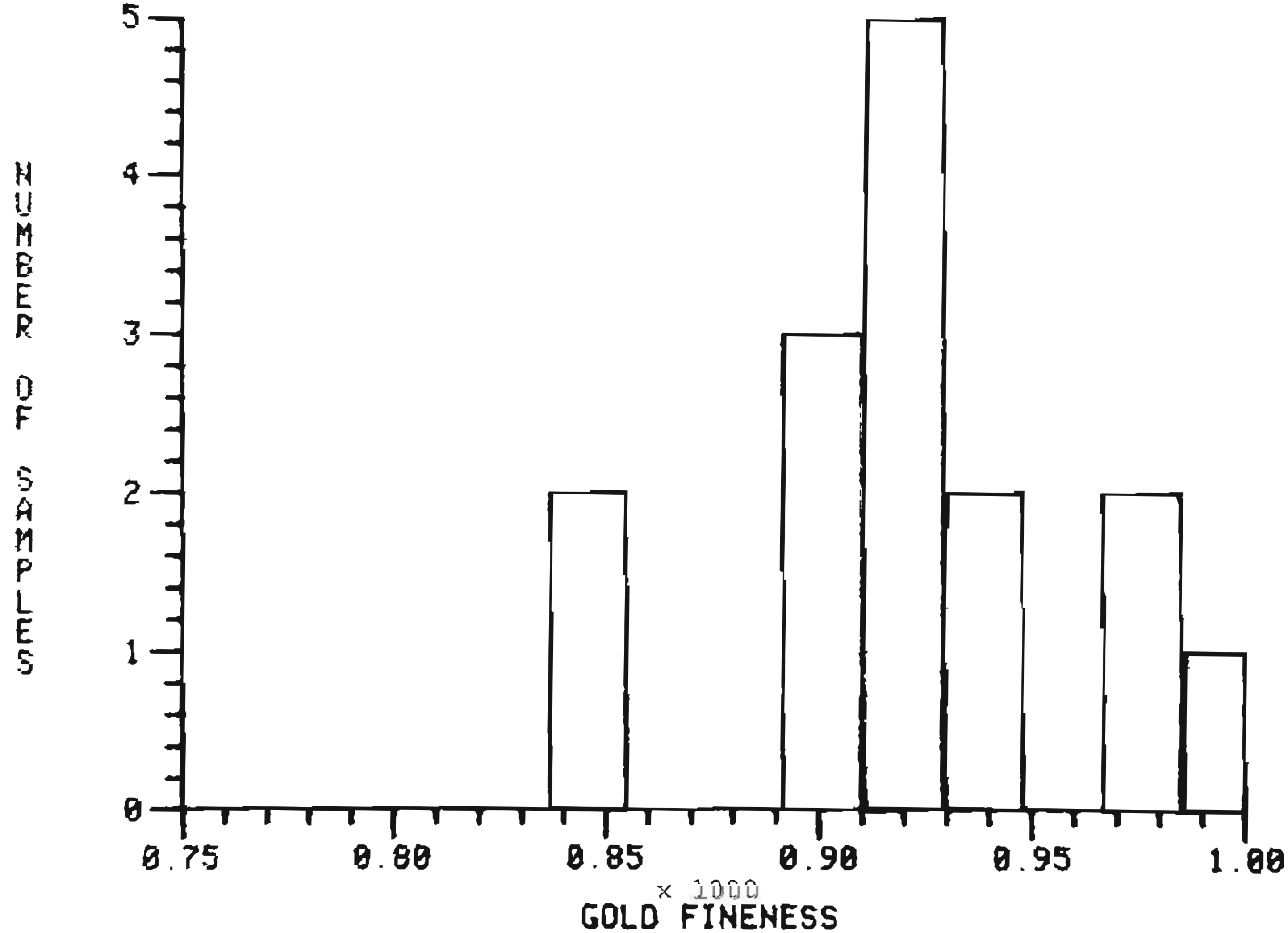

Figure 21: GOLD FINENESS FOR FAIRHAVEN DISTRICT

MEAN= 897, S.D.= 19, N= 15

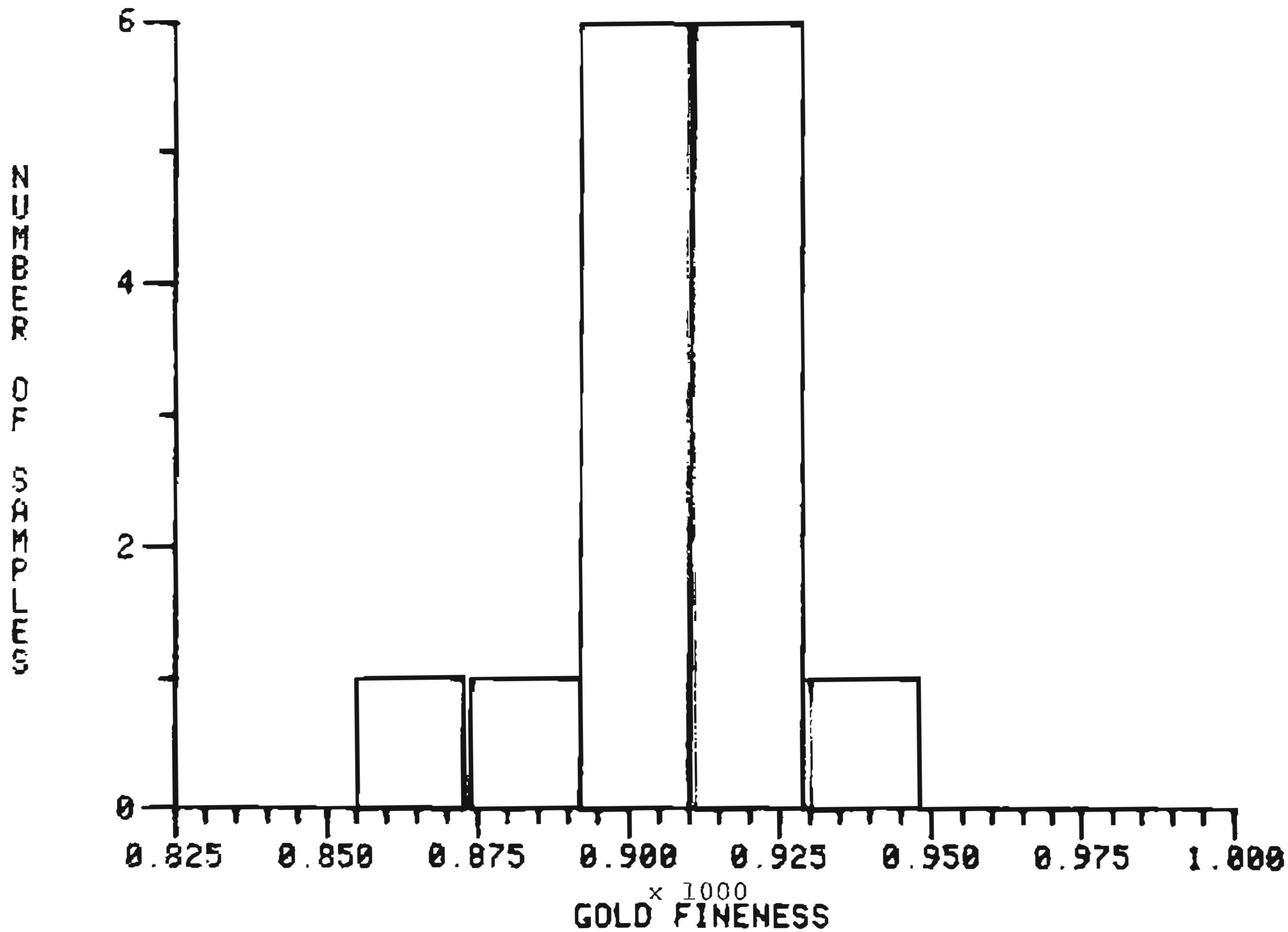

Figure 22: GOLD FINENESS FOR KOUGAROK

MEAN= 908, S.D.= 27, N= 25

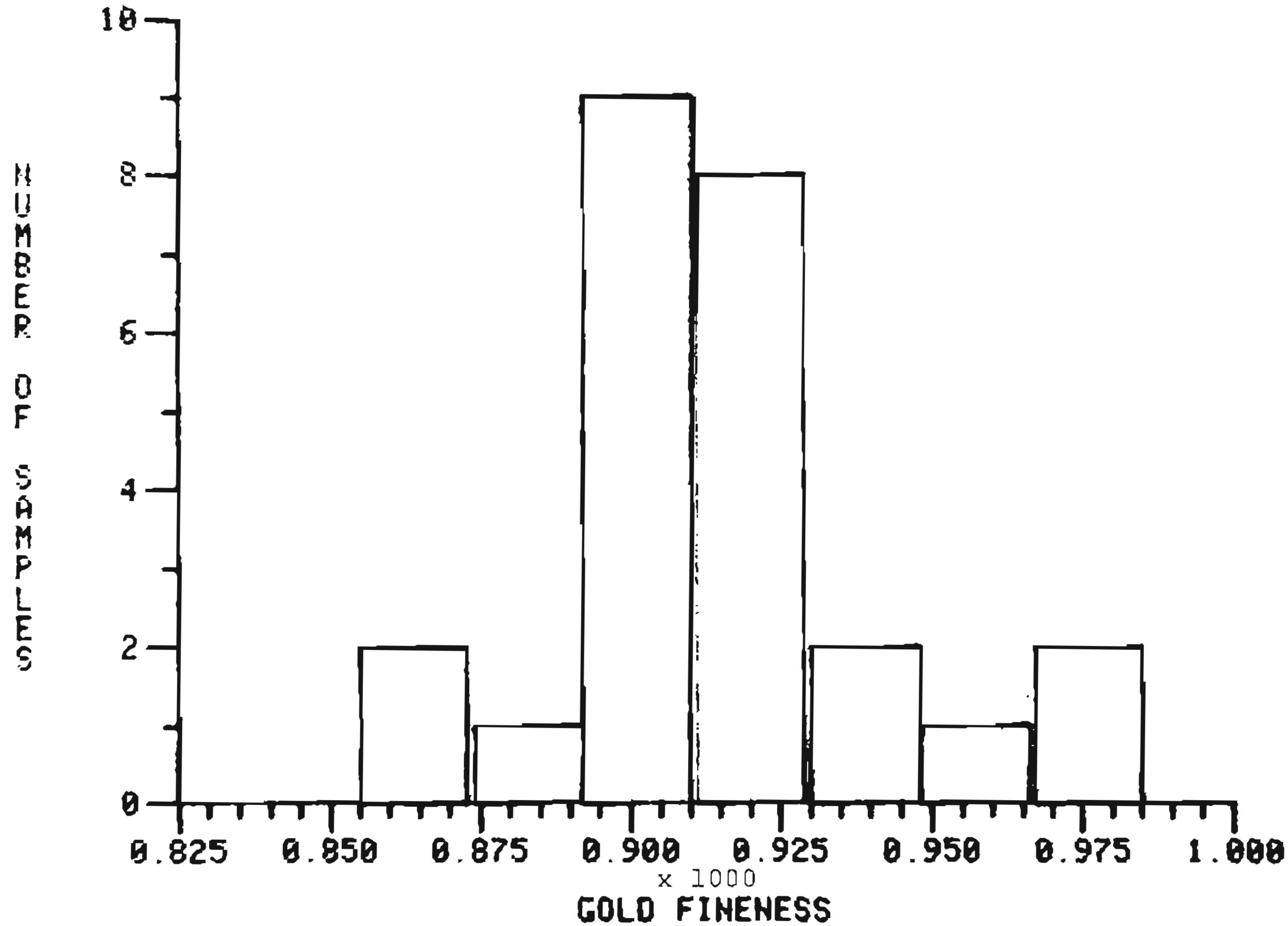

Figure 23: GOLD FINENESS FOR NOME DISTRICT

MEAN= 907, S.D.= 30, N= 55

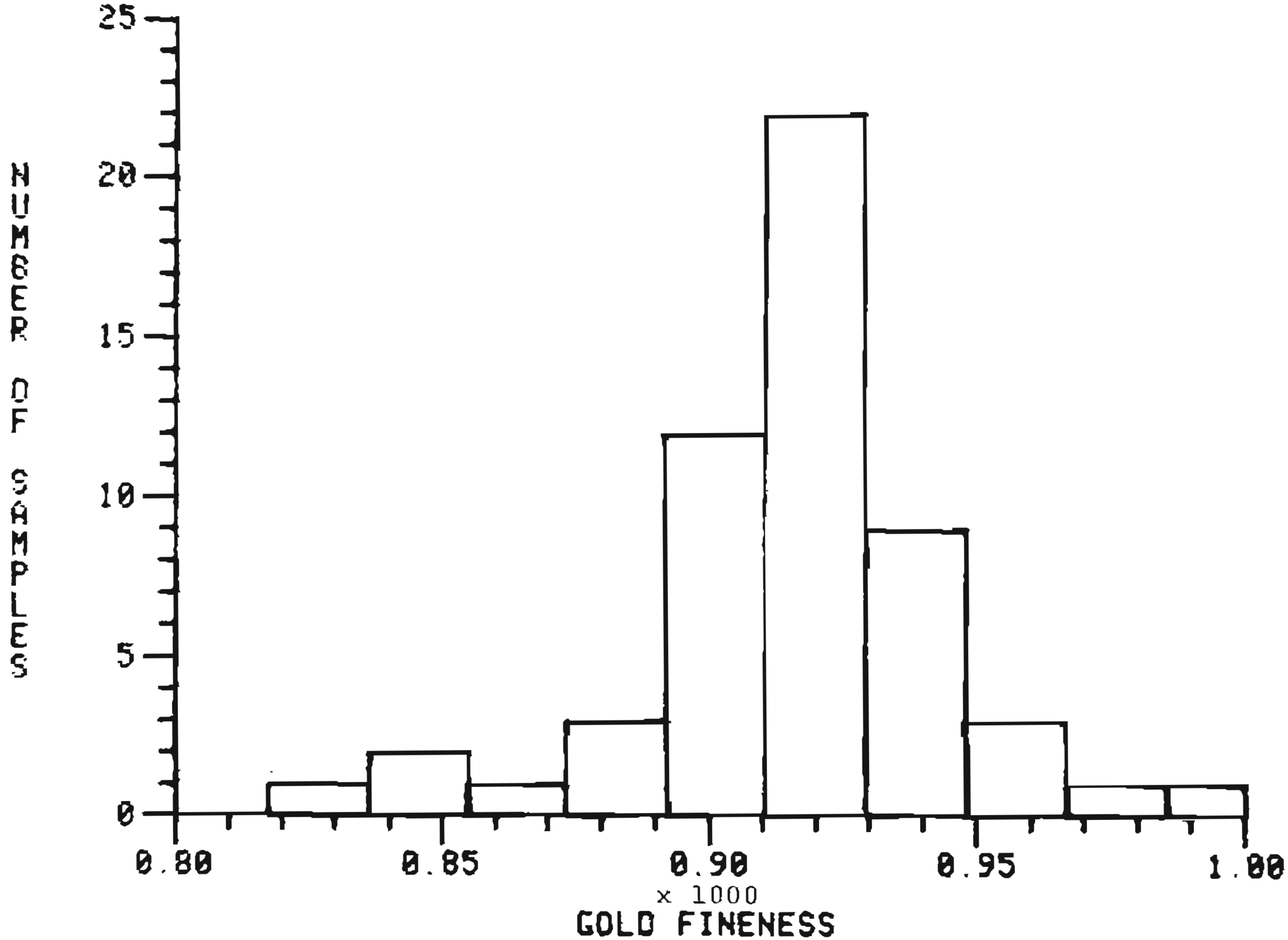

Figure 24: GOLD FINENESS FOR PORT CLARENCE DISTRICT

MEAN= 907, S.D.= 25, N= 13

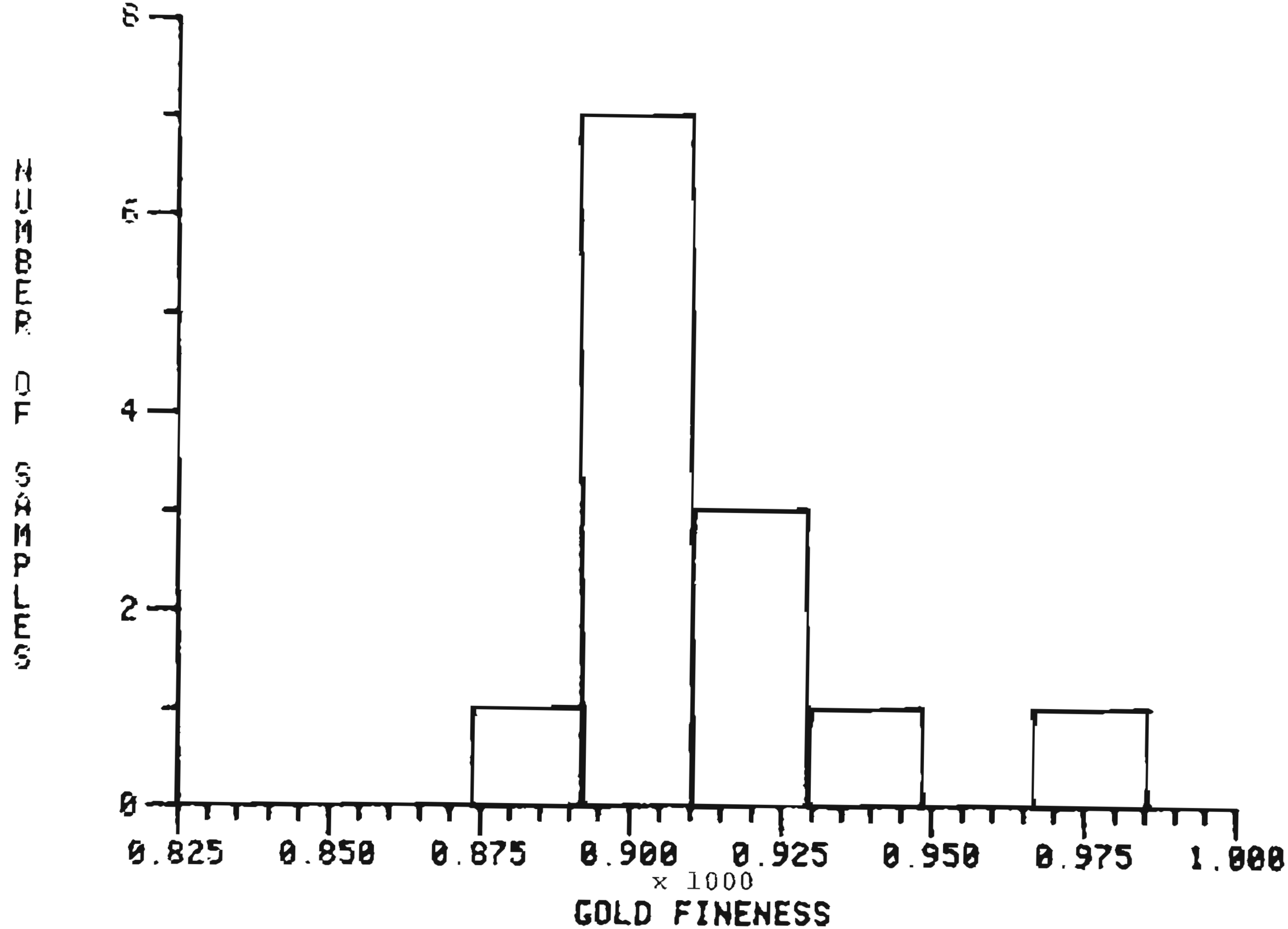

Figure 25: GOLD FINENESS FOR SOLOMON DISTRICT

MEAN= 908, S.D.= 24, N= 18

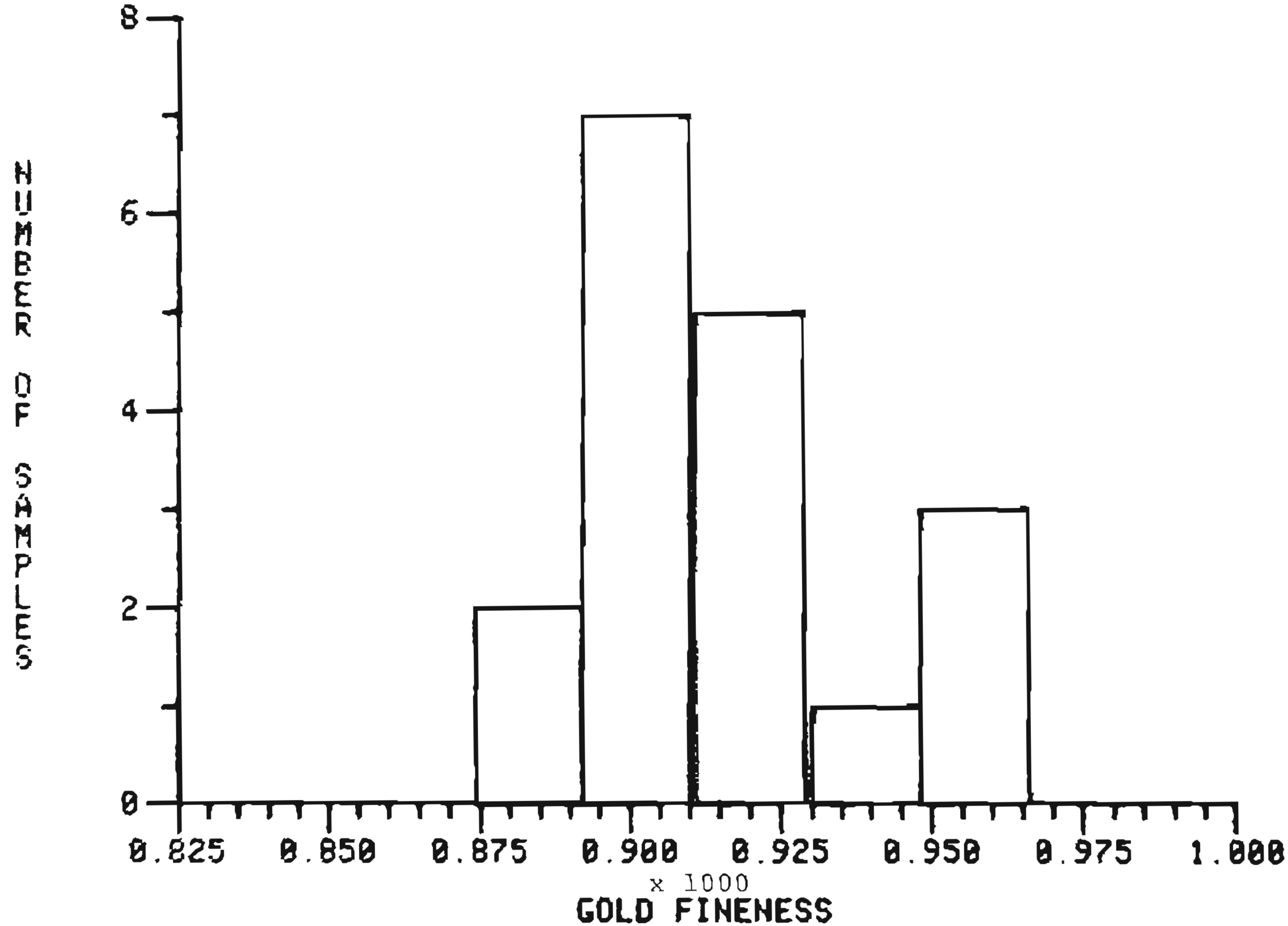

Figure 26: **GOLD FINENESS FOR ALL DISTRICTS**

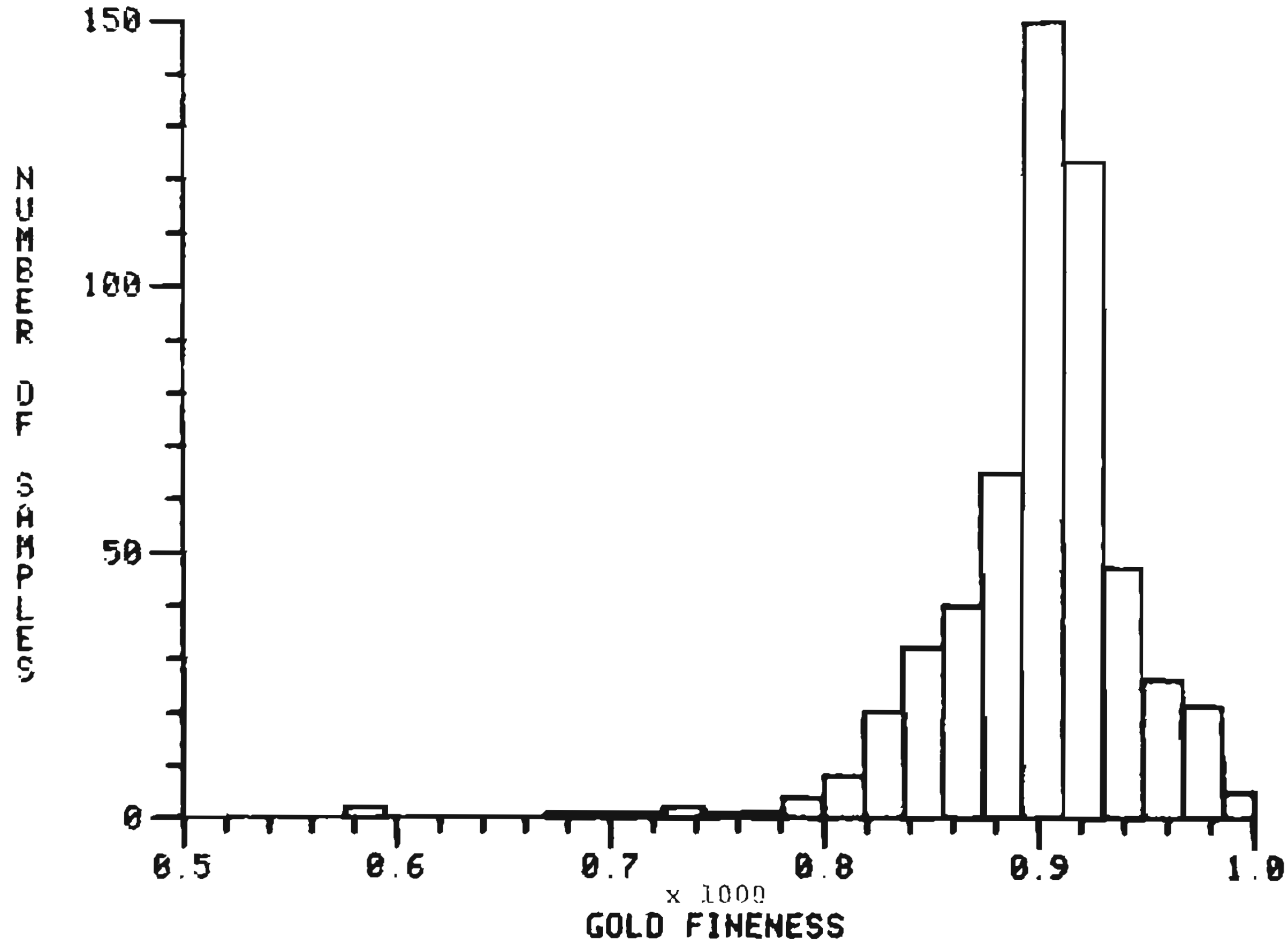

Figure 27: **MEANS OF ALL DISTRICTS**

MEAN= 889, S.D.= 29, N= 41

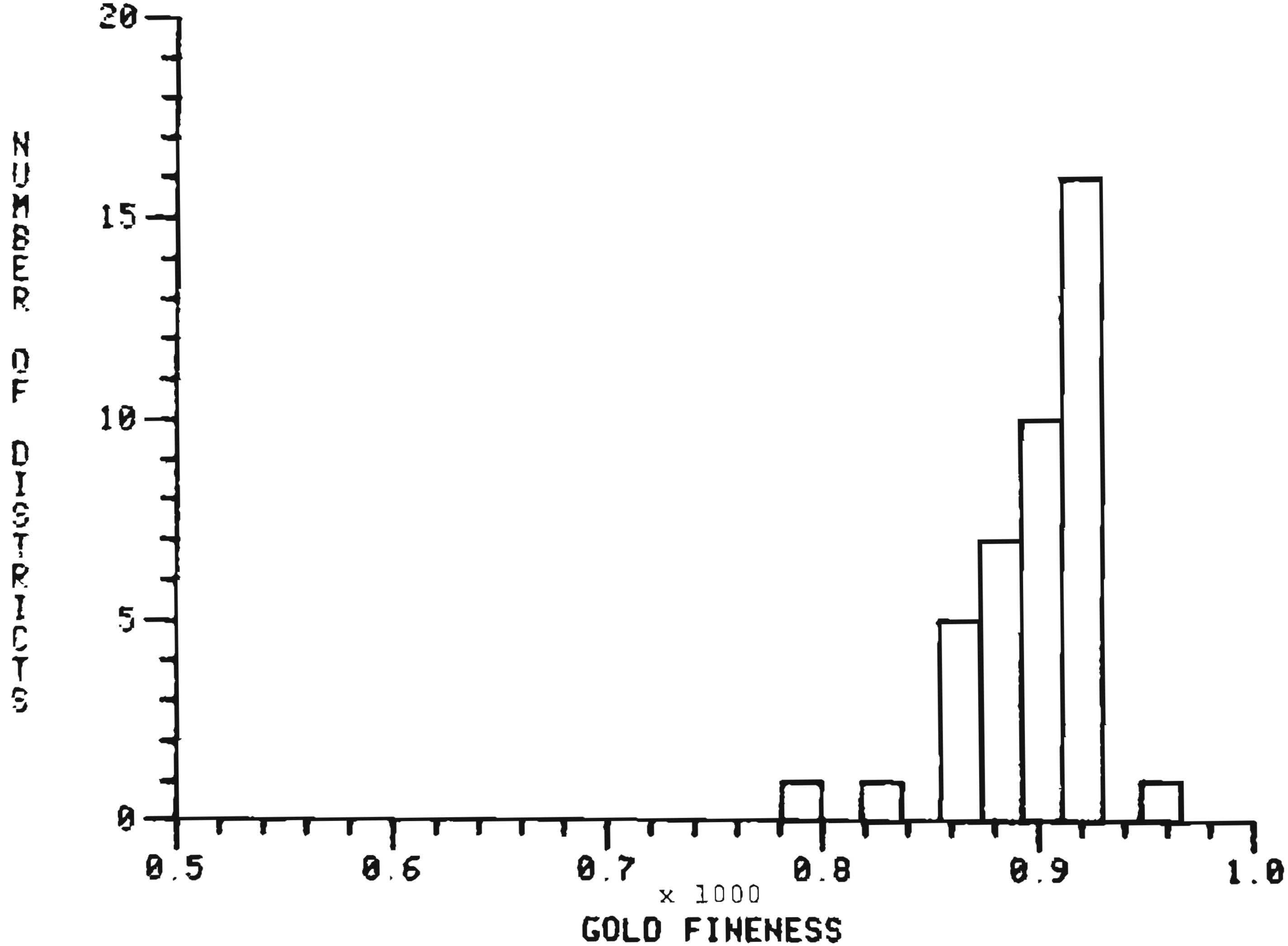

Table 2. Mean, standard deviation and range of gold fineness values by mining district.

District Number	District	No. of Samples	Standard Score for Deviation from Grand Mean	Mean	Standard Deviation	Coefficient Variation	Range
01	Porcupine	1	1.820	941	--	--	--
02	Juneau	1	-2.205	826	--	--	--
03	Yakataga	2	0.805	912	16	1.75	900-923
04	Chistochina	5	0.700	909	24	2.64	866-924
05	Nizina	8	-0.280	881	43	4.88	820-926
06	Nelchina	1	-1.470	847	--	--	--
07	Kenai	9	0.630	907	20	2.21	899-959
08	Girdwood	1	-0.070	887	--	--	--
09	Yentna	24	0.105	892	26	2.91	838-956
10	Valdez Creek	3	0.875	914	32	3.50	891-951
11	Bonnifield	12	-0.910	863	36	4.17	804-926
12	Chandalar	5	-0.280	881	49	5.56	835-958
13	Chisana	5	-1.400	849	38	4.48	805-906
14	Circle	30	-0.910	863	62	7.18	714-984
15	Eagle	11	0.245	896	28	3.13	854-945
16	Fairbanks	40	0.175	894	28	3.13	824-961
17	Fortymile	29	-0.770	867	32	3.69	791-927
18	Gold Hill	5	1.085	920	26	2.83	892-952
19	Hot Springs	24	-0.770	867	59	6.81	782-984
20	Iditarod	19	0.280	897	31	3.46	855-972
21	Innoko	20	-0.210	883	31	3.51	834-946
* 22	Kantishna	11	-3.500	789	126	15.97	567-906
23	Koyukuk	35	0.875	914	44	4.81	734-973
24	Marshall	10	-0.665	870	48	5.52	819-953
25	Rampart	12	0.910	915	27	2.95	883-967
26	Richardson	7	-1.295	852	95	11.15	693-928
27	Ruby	27	0.070	891	40	4.49	798-988
28	Tolovana	9	0.525	904	38	4.20	818-934
29	McKinley	7	0.420	901	10	1.11	883-917
30	Georgetown	3	0.945	916	58	6.33	857-972

Table 2 continued

31	Tuluksak Aniak	12	-0.105	886	37	4.18	814-931
32	Goodnews Bay	6	-0.210	883	15	1.70	861-900
33	Bluff	3	0.595	906	13	1.43	897-921
34	Council	15	0.910	915	43	4.70	838-995
35	Fairhaven	15	0.280	897	19	2.12	852-922
36	Kougaruk	25	0.665	908	27	2.97	850-965
37	Koyuk	5	0.805	912	40	4.39	855-962
38	Nome	55	0.630	907	30	3.31	810-983
39	Port Clarence	13	0.630	907	25	2.76	875-975
40	Solomon	18	0.665	908	24	2.64	865-955
41	Kobuk	5	-0.175	884	33	3.73	833-918

Grand Mean = 889.

$S_{\bar{x}}$ = 28.57

95% Confidence Interval for Mean = 880.2 - 897.7 = 880 - 898

Table 3. Average Gold Fineness Values for Mining Districts Grouped According to Geographic Region.

Region	Districts*	No. of Samples in Districts	Ave. Gold Fineness	Coefficient Variation	Standard Deviation of Average Value	No. of Regions
Seward Peninsula	33,34,35,36, 37,38,39,40, 41	(154)	905	1.02	9.23	9
Yukon-Tanana	11,12,14,15, 16,17,18,19, 25,26,28	(184)	884	2.62	23.2	11
Chandalar-Koyukuk	12,23	(40)	898	2.58	23.2	2
Lower Yukon-Kuskokwin	20,21,22,24, 27,29,30,31, 32	(115)	880	4.14	36.4	9
Copper-Susitna	4,5,6,7,8,9, 10,13	(56)	886	2.92	25.9	8
Southeastern	1,2,3	(4)	893	6.70	59.8	3

Table 4. Host rocks for the mineralization in the Fairbanks mining district (data source: Chapman & Foster, 1969).

		All mineral Occurrences	Hg/Sb/W Occurrences
1.	Silicified schist and schist undifferentiated	121	49
2.	Quartzite and graphite schist	9	7
3.	Muscovite schist and muscovite feldspar schist	32	25
4.	Biotite and biotite garnet schist	3	2
5.	Calc-schist	2	1
6.	Marble	2	1
7.	Greenstone and amphibolite	2	1
8.	Intrusive rocks and skarns undifferentiated	17	9
	TOTAL	188	95

APPENDIX I

Summary of Boyles' (1979) Conclusions Regarding Au/Ag Ratios for Various Deposits:

"1. Only three types of hypogene deposits have Au/Ag ratio consistantly greater than 1. These are the auriferous quartz pebble conglomerate deposits, certain skarn-type deposits and most, but not all, gold-quartz veins in Precambrian, Paleozoic, and Mesozoic rocks. Tertiary deposits in certain belts also have ratios greater than 1, but they are relatively uncommon. All Gold placers always have ratios greater than 1.

2. The Au/Ag ratios in disseminated deposits in shales and sandstones (Kupferschiefer and red bed types) are generally low, indicating a relatively high degree of mobility and concentration of silver during the formation of these particular deposits.

3. In the auriferous quartz-pebble conglomerate deposits the range of the Au/Ag ratios is generally narrow, but there are some significant differences in some deposits such as the Witwatersrand, ...(Range 5.8-15.6).

4. There are few data on the gold content of the "Mississippi Valley type" lead-zinc deposits, and hence a precise knowledge of the Au/Ag ratios is not obtainable.

5. The Au/Ag ratios in skarn deposits are exceedingly variable and related to the mineralogy and hence the chemistry of these deposits.

6. Massive nickel-copper sulphides of the Sudbury type, generally associated with basic igneous rocks, seem to have a narrow range of Au/Ag ratios from about 0.03 to 0.07, ...
7. The porphyry copper deposits tend to have a relatively low Au/Ag ratio judging from the few good data available.
8. The massive polymetallic sulphide deposits (Flin Flon-Noranda-Bathurst type) nearly all have relatively low Au/Ag ratios, which average about 0.025.
9. The polymetallic veins and the native silver-cobalt-nickel arsenide veins have the lowest ratios of all the various types of auriferous hypogene deposits, indicating an extreme mobility for silver and practically no mobility for gold during their formation.
10. Gold-quartz veins in Precambrian, Paleozoic and Mesozoic rocks generally have Au/Ag ratios greater than 2, and these average about 4.2 (range 1.37 to 12.5).
11. Gold-quartz veins, lodes, and stockworks in Tertiary andesite, dacite, rhyolite, and other associated volcanic rocks generally have ratios less than 1 ....
12. Siliceous sinters precipitated from present-day hot springs generally have Au/Ag ratios less than 1.
13. Gold placers always have Au/Ag ratios greater than 1 regardless of age of the source deposits.

14. Deposits in older geological formations are frequently richer in gold than those in younger formations.

15. The evidence that the Au/Ag ratio is an index of temperature of formation or recrystallization of deposits is conflicting. .... On a statistical basis, however, there is some evidence to support the contention that deep-seated (high temperature?) deposits have a higher Au/Ag ratio than those formed at intermediate depths or near the surface, presumably under conditions of lower temperatures.

16. There is considerable evidence to show that the Au/Ag ratio increases in primary haloes with proximity to ore shoots in most types of epigenetic gold deposits.

17. Shcherbina's (1956a) view that gold is predominant in telluride ores whereas silver is dominant in selenide ores appears to be true.

18. Gold and silica (quartz) show a marked association whereas silver tends to be concentrated in an environment where carbonates are abundant.

19. Evidence from many auriferous belts throughout the world indicates that there is a wall rock effect on the Au/Ag ratio, the ratio being higher where the wall rocks are basic than where acidic rocks are the hosts.

20. The Au/Ag ratio in deposits seems to depend on regional metallogenic peculiarities in a crude way, if only certain types of deposits are considered."

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