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Delineation of Mineral Belts of Northern and Central Idaho

by
William R. Green

State of Idaho
CECIL D. ANDRUS, Governor

Idaho Bureau of Mines and Geology
R. R. REID, Director

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This short paper is being published as an Information Circular in order to make the initial results of the study available. In its present form the Circular is essentially the paper that Mr. Green presented at the December, 1971 meeting of the Northwest Mining Association. Compilation of data is still in progress and when all of it has been compiled and tabulated it is our intention to publish a more detailed report.

Idaho Bureau of Mines and Geology
Moscow, Idaho

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DELINEATION OF MINERAL BELTS OF NORTHERN & CENTRAL IDAHO

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INTRODUCTION

For many years geologists have noted that mineral deposits often occur in linear patterns. The origins of these patterns have been variously attributed to structure and outcrop configurations of host rocks, deep seated fracture patterns, and numerous other factors related to the vicissitudes of various geologic processes.

Although the genesis of such lineations is not always fully understood, in fairly recent years this phenomenon has been used to describe the location of metallic mineral deposists and as a guide in prospecting for them. Most of the efforts along these lines have been made by mining companies and thus have remained confidential. However, we are currently beginning to hear more about mineral belts as more people become aware of their importance.

In addition to the obvious impact on regional mineral exploration, the delineation of mineral belts could be of considerable assistance to Federal and State agencies, which are increasingly being called upon to make mineral valuations for land-use classification decisions. This is especially true in the State of Idaho where large tracts of land are constantly being proposed for withdrawal from mineral entry. In most such instances governmental agencies must rely heavily on geologic criteria of a local nature which are most readily available. Unfortunately, the acquisition and analysis of data relating to regional trends is a lengthy and an expensive task; and therefore, the importance of the regional setting of a specific area is often ignored or based largely upon unsubstantiated opinion. Thus, the availability of additional data of this nature could be

an input of significant importance in the total data mix for valuation purposes.

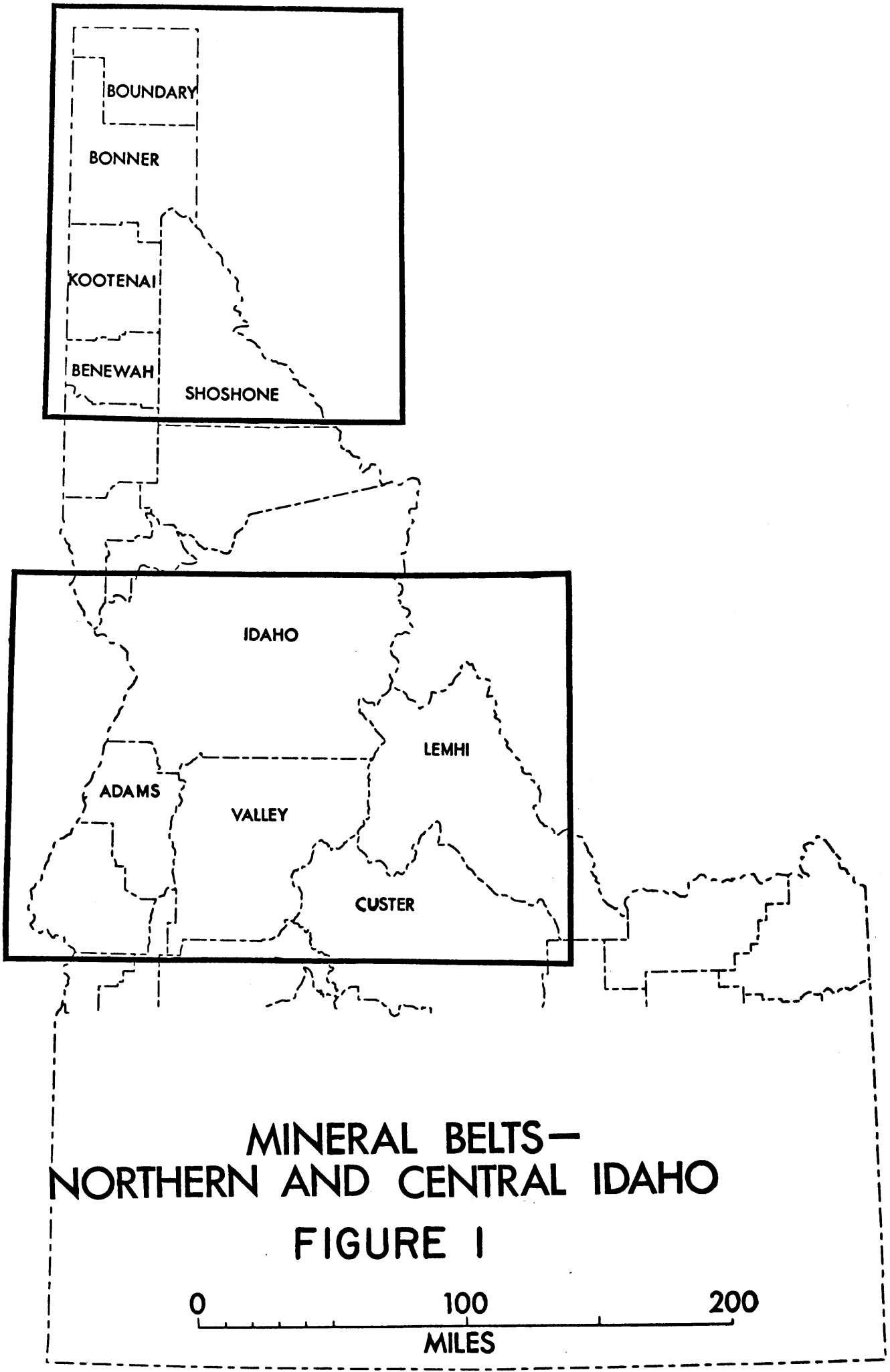
With these thoughts in mind, the Idaho Bureau of Mines and Geology began a project in 1969 to tabulate information on the location of metallic mineral occurrences within the state. Data were obtained from references contained in a bibliography on the geology of Idaho, which had been prepared previously as an initial step in the Bureau's long range plans to compile a new state geologic map. Information recorded included: name, location by section, township and range, principal metallic minerals, past production, and references. Presently this information has been obtained for approximately the northern half of the state and includes several thousand occurrences.

The data thus gathered were cataloged by commodity and location and then plotted on 1:500,000 scale, mylar overlays, one each for gold, silver, copper, and lead-zinc. Prospects as well as producing mines were plotted because it was felt that occurrences when plotted might indicate threshold areas surrounding productive centers and thus more accurately define the mineralized area. A three-symbol production designation was used in these plots with an X for occurrence, a small dot for production up to $300,000, and a large dot for production above that value.

The plots of these data have resulted in the delineation of a number of mineralized belts in northern and central Idaho. Figure 1 shows the location of the two areas in which linear patterns have been noted to date: the northernmost or "panhandle" portion of Idaho and an area in the north-central portion of the state.

BELTS IN NORTHERN IDAHO

Figure 2 shows the location of metallic mineral occurrences in the northern reference area. The locations are a composite of plots for gold, silver, lead, zinc, and copper. Although single commodity data generally show similar patterns, the composite has been found to yield the most distinctive results. The area be-



MINERAL BELTS— NORTHERN AND CENTRAL IDAHO

FIGURE 1

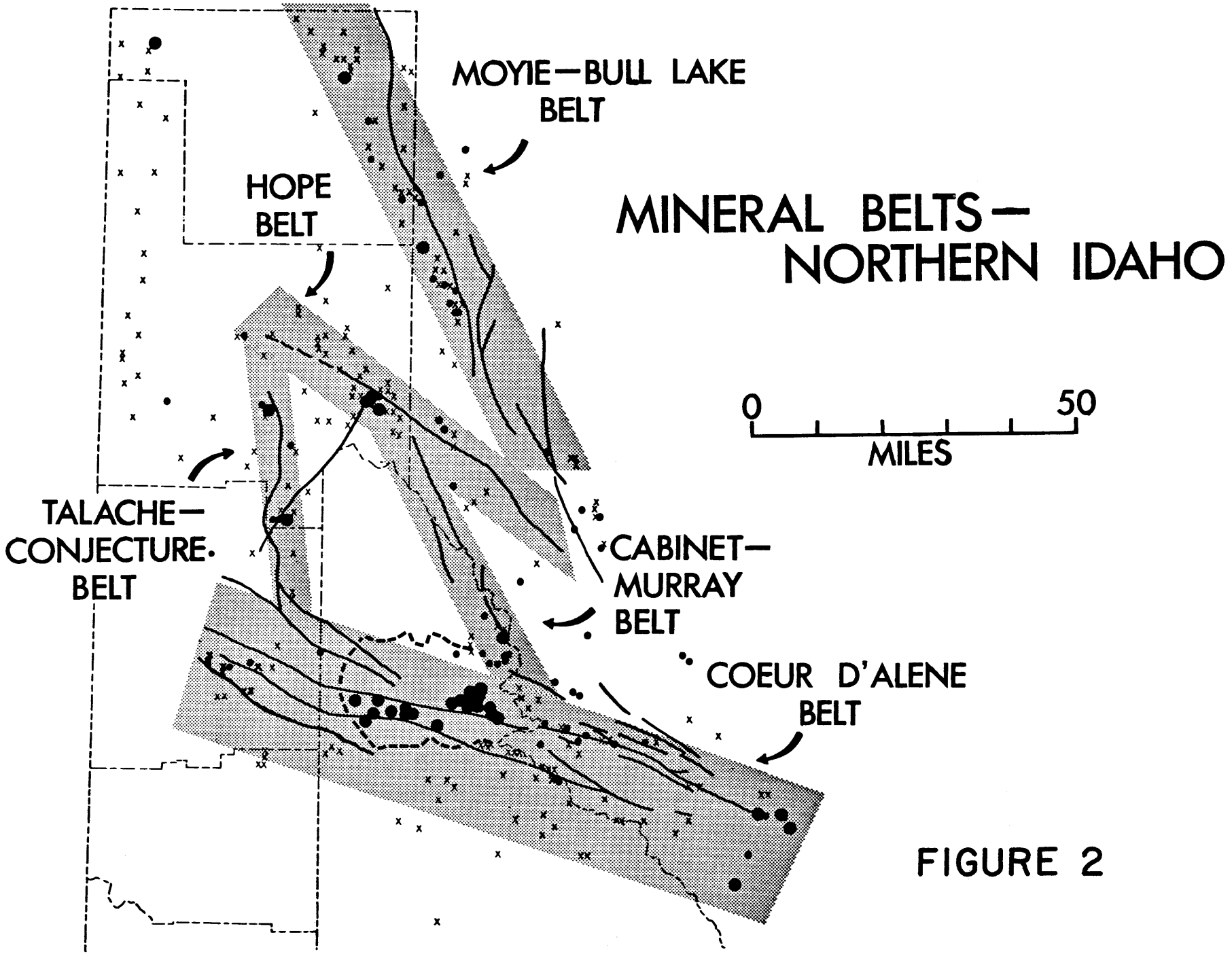

MOYIE—BULL LAKE BELT
HOPE BELT
TALACHE—CONJECTURE BELT
CABINET—MURRAY BELT
COEUR D'ALENE BELT
MINERAL BELTS—NORTHERN IDAHO
0
50
MILES

FIGURE 2

tween the North Fork of the Coeur d'Alene River and the divide between the South Fork and the St. Joe River, bounded by the dashed lines in the lower portion of the figure, represents the Coeur d'Alene Mining District. Because of the difficulty in displaying the large amount of data for this small area, plots of only the top 20 all-time producers were made. Needless to say, if all occurrences were included and the size of the symbols were made proportional to production, much of this area of the map would be black.

At least five prominent belts of metallic mineralization can be distinguished. The are:

1) the Coeur d'Alene belt

2) the Hope belt

3) the Moyie - Bull Lake belt

4) the Talache - Conjecture belt

5) the Cabinet - Murray belt

These data indicate that the grouping of occurrences follows the regional fracture pattern fairly closely. This pattern is characterized by a large number of prominent faults, most of which strike in a northwesterly direction as shown by the black lines in figure 2. Three complex fracture zones dominate the pattern: the Lewis and Clark Line on the south, and the Hope and Leonia fault zones on the north. All three have been traced along strike for considerable distance into western Montana, but appear to die out before they reach the Washington border on the west. In a similar fashion, the density of metallic mineral occurrences declines to the west, with the mineral belts terminating within the central portion of the "panhandle".

The Coeur d'Alene mineral belt follows the most prominent fracture system, which includes the Osburn and associated faults that collectively make up the Lewis and Clark Line (Billingsley and Locke, 1941). This complex zone trends approximately N 70° W, with the Osburn fault exhibiting a strike-slip displacement

of as much as 16 miles. The belt is approximately 22 miles wide and has a length of more than 90 miles. In addition to the great Coeur d'Alene Mining District, this belt includes the Beauty Bay Mining District at its western terminus, and the Saltese, St. Regis, Cedar Creek, and Keystone Mining Districts in western Montana. Although silver, lead, zinc, and copper are the major metallic commodities, the belt also contains significant occurrences of gold, tungsten, and antimony.

The Hope mineral belt follows the Hope fault zone which comprises the Hope and associated faults. This zone strikes N 55° W, and although not as complex a system as the Lewis and Clark Line, it also exhibits a major strike-slip displacement. The belt is approximately 9 miles wide and has a length of more than 80 miles. Mining districts located along this belt include the Clark Fork in Idaho and the Blue Creek, Vermillion, and Eddy Creek districts in western Montana. Major metallic commodities include: silver, lead, zinc, copper, and gold.

The Moyie-Bull Lake mineral belt follows the Leonia fault zone, which is made up of the Leonia, Bull Lake, and Rock Lake faults. This zone exhibits prominent dip-slip displacements and strikes approximately N 25° W across the northeast corner of Idaho extending into Montana and British Columbia. It is approximately 12 miles wide and has a length of at least 95 miles. Included along this belt are the Moyie-Yaak Mining District of Idaho and the Troy Mining District of western Montana. The southern extension of this belt includes an area which is currently receiving considerable attention as a possible major source of copper. Important metallic occurrences include lead, zinc, silver, gold, and copper. Minor amounts of tungsten and molybdenum also occur within this belt.

The Talache-Conjecture mineral belt is related to a number of prominent faults extending between the Hope and Coeur d'Alene mineral belts near their western extremities. The faults exhibit significant dip-slip displacements and

strike approximately N 10° W. The mineral belt is approximately 6 miles wide, 40 miles long, and straddles Pend Oreille Lake. It includes the Talache-Silver Butte area on the north and the Lakeview area on the south. Silver, lead, and zinc are the major metallic commodities. In addition, the belt also contains occurrences of gold and copper.

The Cabinet-Murray mineral belt includes several major fractures which occur parallel to, and along either side of, the Idaho-Montana border between the Hope and Coeur d'Alene mineral belts. Collectively, these fractures strike approximately N 30° W and exhibit major dip-slip displacements. The belt is approximately 7 miles wide and 40 miles long and includes the Pilgrim Creek, Trout Creek, and Prospect Creek Mining Districts in Montana and the Murray-Jack Waite area in Idaho. Principal metallic commodities include: gold, lead, zinc, silver, and copper. Currently the northern end of this belt is undergoing extensive exploration for copper.

BELTS IN CENTRAL IDAHO

Figure 3 shows the location of metallic mineral occurrences in the southern reference area. Again, these data are a composite of all gold, silver, lead, zinc, and copper occurrences. At least four prominent belts can be recognized in this area:

1) the Idaho Porphyry belt

2) the Marshall Mountain-Elk City belt

3) the Dixie-Thunder Mountain belt

4) the Florence-Stibnite belt

Because of the lack of adequate geologic mapping in much of this portion of Idaho, it is difficult to relate belts of mineralization to geologic features. In some instances the structure is known; but in others, the regional pattern has been interpreted from local data and from linears taken from aerial photographs.

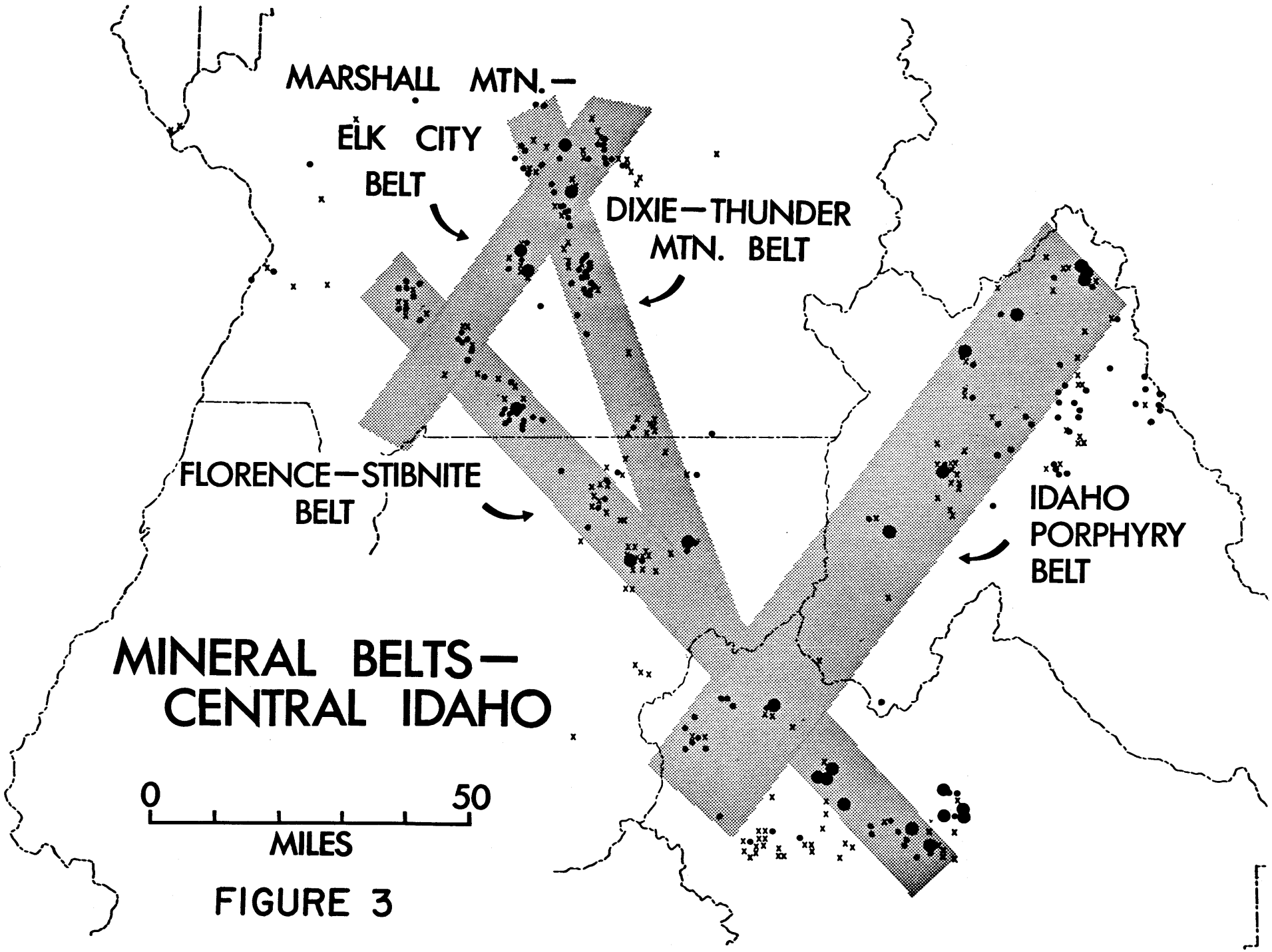

MARSHALL MTN.—
ELK CITY
BELT
DIXIE—THUNDER
MTN. BELT
FLORENCE—STIBNITE
BELT
IDAHO
PORPHYRY
BELT
MINERAL BELTS—
CENTRAL IDAHO
0
50
MILES

FIGURE 3

The Idaho Porphyry belt lies along a major structural zone, which trends from just north of Boise in an approximate N 45° E direction well into Montana. This zone is characterized by numerous dike swarms and stocks as well as intrusives of batholithic proportions. The belt is approximately 18 miles wide in the reference area and includes the Seafoam, Loon Creek, Sheep Mountain, Yellow Jacket, Blackbird, Musgrove, Mackinaw, Mineral Hill, Indian Creek, andGibbonsville Mining Districts. To the west, it includes the Boise Basin and Pearl Mining Districts, and to the east, several mining districts in western Montana, including the Butte district. Although copper and gold are the major metallic commodities, it also contains significant occurrences of cobalt, molybdenum, lead, zinc, and silver.

The Marshall Mountain-Elk City mineral belt extends in a N 40° E direction along a prominent trend of lineations that can be observed on aerial photographs. Structural data from studies of districts and individual deposits tend to confirm this trend. The belt is approximately 9 miles wide and extends for 50 miles in length. It appears to definitely terminate at both its northern and southern ends. From south to north the belt includes the Marshall Lake, Buffalo Hump, Orogrande, Ten Mile, and Elk City Mining Districts. The major metallic occurrences are gold and silver, although significant occurrences of copper, tungsten, and molybdenum are also present.

The Florence-Stibnite mineral belt extends in a N 45° W direction along a prominent trend of lineations appearing on aerial photographs. This belt is about 10 miles wide and extends for at least 130 miles along strike, showing a spectacular alignment of more than 100 metallic occurrences. The mineral belt appears to terminate at its northern end. The southern terminus cannot be accurately determined at this time because the data have not yet been collected for this portion of Idaho. From the north this belt includes the Florence, Marshall Lake, Warren, Profile, Yellow Pine, Loon Creek, Yankee Fork, and Bayhorse

Mining Districts. The principal metallic occurrences include gold, silver, lead, zinc, tungsten, antimony, molybdenum, and mercury. The southern extension of this belt includes an area which is currently receiving considerable attention as a possible major source of molybdenum.

The Dixie-Thunder Mountain mineral belt extends in a N 20° W direction also along a prominent trend of lineations which appear on aerial photographs. This belt is approximately 8 miles wide and 80 miles long. On the south it appears to split from the Florence-Stibnite belt, while on the north it appears to terminate northwest of Elk City. From its northern end it includes the Newsome, Ten Mile, Orogrande, Dixie, Edwardsburg, Ramey Ridge, and Thunder Mountain mining districts. The principal metallic occurrences are gold and silver. Smaller but significant occurrences of copper and tungsten have also been found along this belt.

Because of its continuity over an amazing length, and the strength and variety of its mineralization, the Florence-Stibnite mineral belt deserves additional discussion. Although it is known to traverse a wide assortment of rock types which range in age from Precambrian to Miocene, very little detailed geologic mapping has been done along this zone. In addition, the information contained in the literature gives very little geologic evidence for its existence. Thus this belt is defined at present only by the position of the occurrences themselves and a few prominent air photo linears. Although it appears to terminate at its northern end, the topographic evidence indicates the continuation of lineations for a considerable distance to the northwest. Also, the largest batholith of probable Laramide age thus far mapped in Idaho occurs at the intersection of this zone and the Idaho Porphyry belt.

These data thus indicate that the Florence-Stibnite mineral belt may possibly lie along a zone of crustal weakness of continental proportions. It is interesting to note that this belt is located in approximately the projected position of a

transverse zone proposed by R.G. Yates (1968). The existence of this trans-Idaho discontinuity is based upon lithologic and stratigraphic information taken from northeastern Washington and southeastern Idaho.

SUMMARY

Also of particular interest are the positions of several of the mineral belts in relation to the Idaho Primitive area as shown in figure 4. Not only do the mineral belts intersect portions of the area currently under study, but they also pass through other areas which have been proposed for single-use classification. Because the belts represent trends in which metallic mineral deposits have a statistically greater than normal chance of occurring, their location should be of considerable assistance to mineral resource evaluators. This would be especially true during the preliminary stages of planning the evaluation project.

This discussion has dealt only with the description of metallic mineral occurrences in northern and central Idaho. The work done to date has been of a preliminary nature and has been chiefly descriptive. Thus it leaves many questions unanswered. Additional literature search, field work confirmation, determination of relative ages of mineralization, and studies on mineral zoning will shed much additional light on the subject of mineral belts in Idaho.

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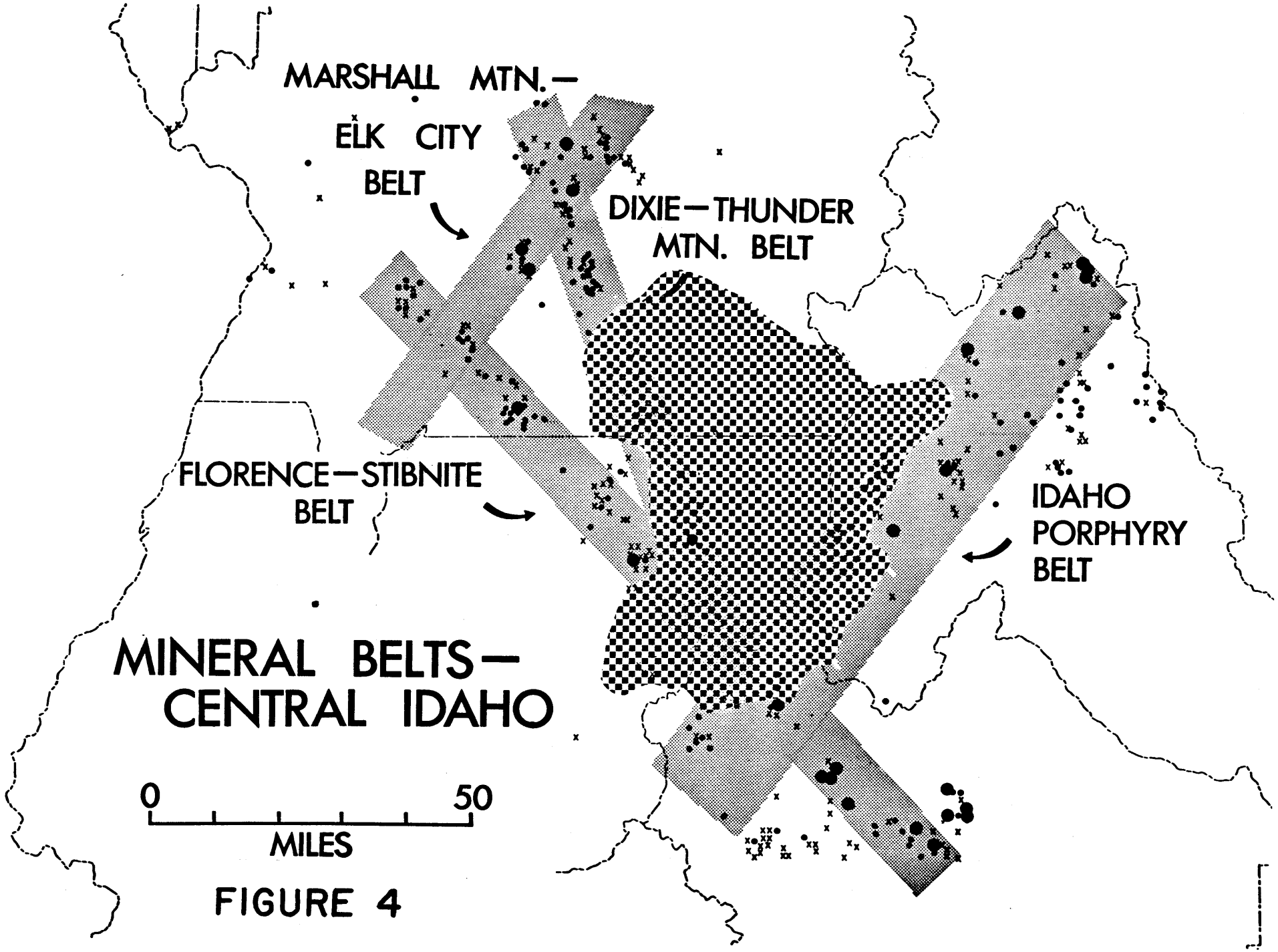
MARSHALL MTN.—
ELK CITY
BELT
DIXIE—THUNDER
MTN. BELT
FLORENCE—STIBNITE
BELT
IDAHO
PORPHYRY
BELT
MINERAL BELTS—
CENTRAL IDAHO
0
50
MILES

FIGURE 4