STUDIES RELATED TO WILDERNESS
PRIMITIVE AREAS

SALMON RIVER BREAKS, IDAHO

GEOLOGICAL SURVEY BULLETIN 1353-C

Mineral Resources of the Salmon River Breaks Primitive Area, Idaho

By PAUL L. WEIS *and* LEONARD J. SCHMITT, JR., U.S. GEOLOGICAL SURVEY,
and by ERNEST T. TUCHEK, U.S. BUREAU OF MINES

With a section on AEROMAGNETIC SURVEY

By W. E. DAVIS, U.S. GEOLOGICAL SURVEY

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An evaluation of the mineral potential of the area

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1972

UNITED STATES DEPARTMENT OF THE INTERIOR

ROGERS C. B. MORTON, *Secretary*

GEOLOGICAL SURVEY

V. E. McKelvey, *Director*

Library of Congress catalog-card No. 77-189988

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402
Stock Number 2401-2102

STUDIES RELATED TO WILDERNESS

PRIMITIVE AREAS

In accordance with the provisions of the Wilderness Act (Public Law 88–577, Sept. 3, 1964) and the Conference Report on Senate bill 4, 88th Congress, the U.S. Geological Survey and the U.S. Bureau of Mines are making mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System. Areas classed as "primitive" were not included in the Wilderness System, but the act provided that each primitive area should be studied for its suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. This bulletin reports the results of a mineral survey of the Salmon River Breaks Primitive Area, Idaho, and some adjoining national forest lands that may come under discussion when the area is considered for wilderness designation.

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MINERAL RESOURCES OF THE SALMON RIVER BREAKS PRIMITIVE AREA, IDAHO

By PAUL L. WEIS and LEONARD J. SCHMITT, JR.,
U.S. GEOLOGICAL SURVEY, and
ERNEST T. TUCHEK, U.S. BUREAU OF MINES

SUMMARY

A mineral survey was made of the Salmon River Breaks Primitive Area and part of the adjacent Horse Creek drainage by the U.S. Geological Survey and the U.S. Bureau of Mines in 1968–70. The area consists of 269,000 acres of steep, rugged, generally densely wooded mountains that form the north side of the Salmon River Canyon in central Idaho. Most of the area is underlain by intensely metamorphosed igneous and sedimentary rocks of Precambrian age which have been intruded and locally altered by at least four plutons of the Idaho batholith.

The mineral survey included reconnaissance geologic mapping, an aeromagnetic survey, and the collection of about 845 samples of several types during more than 46 man-months of field investigation. Stream-sediment samples were taken from all major streams and most tributaries. Samples of stream gravel were panned to check for heavy-mineral concentrations, especially gold. Rock samples were taken during both stream and ridge-crest traverses. Extensive sampling and detailed studies were made in the areas of old workings, mining claim locations, and areas of potential mineral deposits. Test pits and trenches were excavated in gravel bars and terraces along the Salmon River in order to sample the content of gold and other heavy metals of these deposits.

More than one-third of Idaho's total gold production came from a broad northeast-trending belt that lies just west of the study area and includes the gold camps of Elk City, Orogrande, Tenmile, Dixie, Florence, Buffalo Hump, Warren, and Burgdorf. At one point the belt is within 2 miles of the study area. None of the gold camps were producing ore at the time of the study. County records show that more than 200 mining claims have been located in the area, nearly all within 1 mile of the Salmon River. Since the discovery of gold along the Salmon River in the 1860's all of the Salmon River valley in the study area has been held by placer mine location at one time or another.

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During the 1870's and during subsequent major periods of economic depression, gravels along the Salmon River were worked on a small scale for placer gold. The grade of the deposits is too low to support placer operations under usual economic conditions.

The Painter mine, in the extreme southwest corner of the study area, produced a small quantity of gold from a lode prior to World War II. Mineralization at the deposit appears too sparse, erratic, and low grade to constitute a significant resource.

Fluorite occurs in three ore shoots associated with a large quartz vein near Big Squaw Creek. The deposit is estimated to contain 100,000 tons of commercial-grade ore, but the cost of extraction and transportation would exceed the potential market value of the fluorite under current or probable future conditions.

A small area on Prospect Ridge is underlain by rocks that contain copper, lead, zinc, silver, and tin minerals. The occurrence appears too small to be of economic interest.

The investigation of the Salmon River Breaks Primitive Area revealed no important mineral resources. Geologic, geochemical, and geophysical data all suggest that the likelihood of important new discoveries is extremely low.

INTRODUCTION

The Salmon River Breaks Primitive Area comprises approximately 217,000 acres of mountainous country in central Idaho (figs. 1, 2). A contiguous area of about 52,000 acres east of the primitive area was also included in this study. The entire area occupies parts of the Salmon, Nez Perce, and Bitterroot National Forests in Lemhi and Idaho Counties.

The area can be reached by dirt or gravel roads from the southeast, north, and southwest. The Nez Perce Trail, a dirt and gravel road from Darby, Mont., to Elk City, Idaho, forms part of the north boundary of the area. The Salmon River is also accessible by boat or float trips about 8 months of the year, during the spring, summer, and fall. In good weather light planes can land at Crofoot airstrip and at airstrips near Dale and Ayers. Many parts of the area have good trails maintained by the U.S. Forest Service; a notable exception is the trailless valley of Sabe Creek.

The dominant physical feature is the canyon of the Salmon River, the "River of No Return" that turned aside Lewis and Clark (DeVoto, 1953, p. 219). Only since about 1958 have inboard and outboard boats been developed with sufficient power to permit travel upriver through the many rapids. Greatest drop at any one point in the river is about 8 feet at Salmon Falls. With modern powerboats even this obstacle can be crossed in both directions.

The canyon is extremely rugged. The river elevation ranges from about 2,890 feet at the east side of the primitive area to

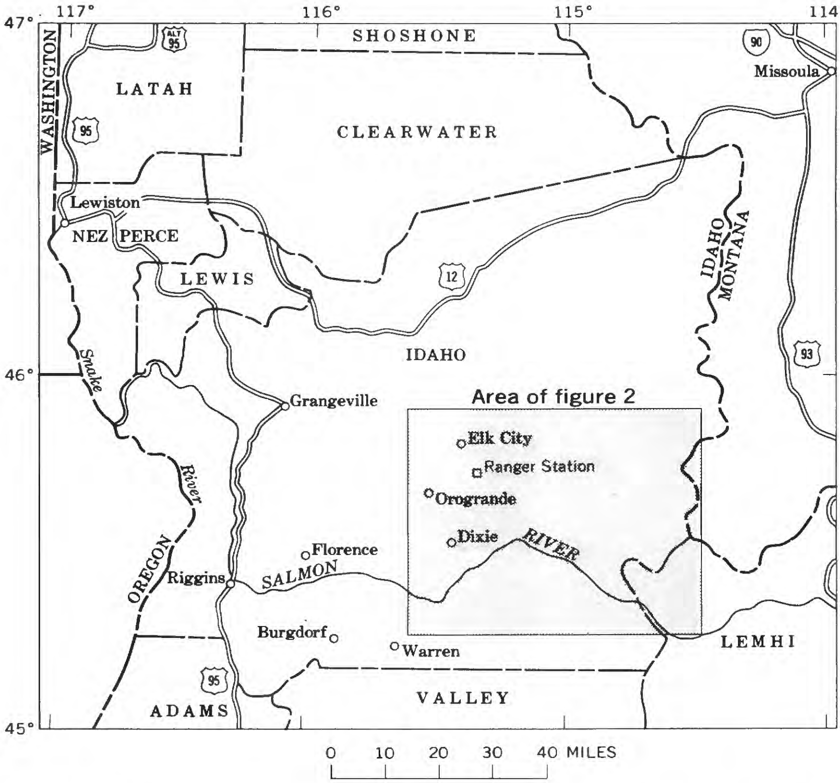

FIGURE 1.—Index map of central Idaho showing area (shaded) of shaded relief map (fig. 2) and localities mentioned in text.

about 2,200 feet at the west side. In many places, ridge crests higher than 8,000 feet lie within 3 miles of the river. Farther from the main canyon of the Salmon, major valleys are almost as steep, though not so deep. Ridges more than about 7,000 feet above sea level have been glaciated, and cirques of moderate size, many containing lakes, are characteristic of several localities. Highest point in the area is Salmon Mountain, 8,991 feet above mean sea level.

The area includes the headwaters of the Selway River, a north-flowing tributary to the Clearwater. All other streams are tributary to the Salmon. Major streams having all or most of their watersheds within the primitive area are Horse Creek, Sabe Creek, and Bargamin Creek (fig. 2).

The steep south-facing slopes along the Salmon River are mostly grassy in their lower parts, with scattered yellow pine,

FIGURE 2.—Shaded relief map of Salmon

River Breaks Primitive Area and vicinity.

sage, and mountain-mahogany. At higher elevations these give way to Douglas-fir, grand fir, and lodgepole pine. Away from the river, a large part of the area is covered with a dense growth of lodgepole and whitebark pine (fig. 3). Beargrass and huckleberries grow abundantly, especially in the many old burns. None of the area is above timberline, though trees are sparse on most of the ridge crests above 8,000 feet.

FIGURE 3.—Aerial view south toward the Salmon River from the headwaters of Sabe Creek. Note the nearly accordant summits.

Except along the river, most of the visitors to the area are elk or sheep hunters. Few people penetrate the ridge trails for summer hiking, camping, or fishing in the alpine lakes, although a moderate number of tourists travel the Nez Perce Trail by car in July and August. By contrast, the Salmon River carries numerous vacationers on float and boat trips in the summer, and many hunters and fishermen in the fall. Some river traffic is by the few permanent residents of the canyon, who maintain ranches or homes at Ayers Ranch, Allison Ranch, Dale Ranch, and Lantz bar.

PREVIOUS WORK

The Salmon River Breaks area has had relatively little attention from geologists; Lindgren (1904, p. 66) was probably the first to investigate rocks of the area, and he published a generalized geologic map of the rocks along the Nez Perce Trail. Shenon and Reed (1936) floated through the canyon in 1935. In 1957 and 1958 the U.S. Geological Survey and U.S. Bureau of Mines conducted an exploratory drilling program under a Defense Minerals Exploration Agency contract at the fluorspar deposit near Big Squaw Creek. More recently, geologists for the Idaho Bureau of Mines and Geology conducted geologic reconnaissance in an adjoining area to the north (Greenwood and Morrison, 1967).

PRESENT INVESTIGATIONS

The U.S. Geological Survey began work in the area in 1968 and completed it in 1969. Weis and Schmitt did reconnaissance geologic mapping and collected rock and stream-sediment samples, assisted by Douglas McKeever and Richard Hutchens in 1968 and by Hutchens in 1969. Weis and Robert Pearson made a traverse of the Salmon River Canyon in October 1968. Arthur Toevs, chemist, and David Grimes, spectrographer, analyzed samples in mobile laboratories in the field.

The U.S. Bureau of Mines began its studies in June 1968 and continued them during the summer months in July 1970. Examination work was by Tuchek assisted periodically by Ronald M. Van Noy, Joseph S. Coffman, Robert D. Weldin, Jon P. Stone, and Nicholas T. Zilka. Placer samples were processed and prepared for assay by Dean Holt and James A. Canwell. Gold and silver assays were by the Reno Metallurgical Center, U.S. Bureau of Mines.

ACKNOWLEDGMENTS

Fieldwork by the Geological Survey was greatly facilitated by the hospitality of Robert Shackleford, District Ranger, U.S. Forest Service, and by the generosity and cooperation of all the Forest Service personnel at Magruder Ranger Station. Thanks to them we were able to use the station as our field headquarters for both summers' work. Without that privilege we would have had to headquarter many miles farther from the study area at considerable inconvenience and added expense.

The U.S. Bureau of Mines appreciates particularly the cooperation and assistance of personnel of the Nez Perce, Bitterroot, and Salmon National Forests. Appreciation is also extended to the many local residents who aided the studies in innumerable ways.

GEOLOGY

By Paul L. Weiss and Leonard J. Schmitt, Jr., U.S. Geological Survey

GEOLOGIC SETTING

The Salmon River Breaks Primitive Area lies across the center of the Idaho batholith, a complex mass of igneous and metamorphic rocks that underlies a large part of the mountains of central Idaho. In the study area, gneissic igneous and sedimentary rocks appear to be the oldest formations present (pl. 1). In two areas, rocks believed to belong to the Belt Supergroup were found. Their relationship with the gneisses is not clear, but in one place their contact may be gradational.

The older metamorphic rocks have been intruded by plutons ranging from quartz monzonite to granodiorite in composition and from a few square miles to many tens of square miles in area. Granitization of the older rocks accompanied the emplacement of some of the plutons, and some plutons also have gneissic border zones that formed during emplacement.

At one time the older gneisses of parts of central Idaho were thought to be the same age as the intrusives and the entire mass was believed to be genetically related—hence the concept that the area is underlain by a single batholith. Subsequent detailed work has shown that the Idaho batholith, like others, is a composite body containing many plutons of different compositions and ages (Anderson, 1952; Ross, 1934). Moreover, in the Salmon River Breaks there seem to be great differences in age between the igneous rocks and some of the gneisses. The metasedimentary gneisses have undergone metamorphism in the katazone or lower mesozone, apparently before deposition of the Belt(?) rocks and certainly before emplacement of the metaigneous rocks. The much later emplacement of the igneous rocks of the Idaho batholith was accompanied by metamorphism at lower pressures and temperatures. The older metamorphic rocks are much more abundant than Cretaceous(?) intrusive bodies of the batholith.

In a few places, dikes of presumed Tertiary age cut the metamorphic rocks. Most of the dikes are 20 to 200 feet thick and are parallel to the strike of the enclosing gneiss. No Tertiary dikes were seen to intrude plutons, except for the large rhyolite dike on Boston Mountain, which is probably intrusive into quartz monzonite.

The area was uplifted in late Tertiary and Pleistocene time, and what was once a relatively flat surface now is deeply dissected. The nearly accordant summits of central Idaho (fig. 2) have been noted by many earlier workers (Fenneman, 1931,

p. 185–189). Pleistocene glaciation subsequently modified contours of the higher ridges. (See figs. 3, 6, and 8.)

METAMORPHIC ROCKS

GNEISSIC SEDIMENTARY ROCKS

A group of intensely metamorphosed sedimentary rocks appear to be the oldest rocks in the study area. They are predominantly quartz-plagioclase-microcline-biotite gneiss, locally migmatitic and having well-developed layering and foliation. In places, they contain interlayers of quartzitic gneiss, quartzite, and calc-silicate gneisses that are a few inches to several hundred feet thick. Garnet, sillimanite, and diopside are sparse accessory minerals in a few of the layers. Some calc-silicate gneiss contains coarse poikilitic green hornblende. The rocks appear to have undergone intense metamorphism at high pressures and temperatures—the sillimanite-almandine subfacies of the almandine-amphibolite facies of Fyfe, Turner, and Verhoogen (1958, p. 228–232). They do not appear to have undergone severe shearing stresses during metamorphism. In places the injection of igneous material has resulted in a variety of textures and compositions (fig. 4).

FIGURE 4.—Gneissic sedimentary rocks in cirque basin south of Salmon Mountain. Layering is injected and partly replaced by igneous material.

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Relict bedding in the quartzites and gross compositional layering of the metasedimentary rocks generally are parallel to the gneissic layering and foliation. In most outcrops foliation is fairly regular, though intense small-scale contortions were seen in places.

GNEISSIC IGNEOUS ROCKS

A second group of quartz-plagioclase-microcline gneisses contain biotite or hornblende, or both and are intrusive into the metasedimentary rocks. These intrusive relationships can be seen along the Nez Perce Trail 1 to 3 miles west of Salmon Mountain, and along the trail in the lower 3 or 4 miles of Bargamin Creek. In both of these areas layering of the gneissic sedimentary rock is cut by gneissic igneous rock, and in places inclusions of the older rock are present in the younger. In the gneissic igneous rock, hornblende is generally fine grained and dark greenish brown and shows preferred orientation, whereas the hornblende in the metasedimentary rock is generally coarse, olive green, visibly poikilitic, and randomly oriented. Where large areas are underlain only by biotite gneiss, field criteria are not known that identify it as igneous, sedimentary, or a mixture of the two. Generally the gneissic igneous rock seems to be more uniform in composition and texture than the gneissic sedimentary rock, but this is not always evident from available exposures.

Under the microscope, distinction is easier. Gneissic igneous rocks show igneous features such as oscillatory zoning in the plagioclase feldspars. Gneissic layering is apparently a primary igneous feature rather than the result of intense later metamorphism.

GNEISS

Gneisses of igneous and metasedimentary origins were mapped separately wherever they could be recognized, provided one type or the other made up at least 75 percent of the rock. These distinctions were not everywhere possible. In places the two types made up nearly equal proportions of the country rock. In many places field criteria were not adequate to identify the origin of the rocks. Where large areas are underlain almost entirely by uniform-textured biotite gneiss, the origin was not apparent. In areas where the origin was not readily determinable, these mixed rocks were mapped simply as gneiss.

Also included in the unit mapped as gneiss are rocks that were granitized during emplacement of at least one of the plutons of the Idaho batholith. These rocks underlie an area of about 50 square miles, mostly on the northern part of the ridge between Sabe and Bargamin Creeks. The gneisses were partly recrystallized, and generally have finer textures and lighter colors than nongranitized counterparts. Foliation and layering were partly destroyed, or locally eliminated, mostly by destruction of biotite. These changes are best observed in the broad exposures of fresh rock southeast of Dry Saddle, especially in the cirque walls at the heads of Goodman, Saddle, and Ring Creeks (fig. 5). To the

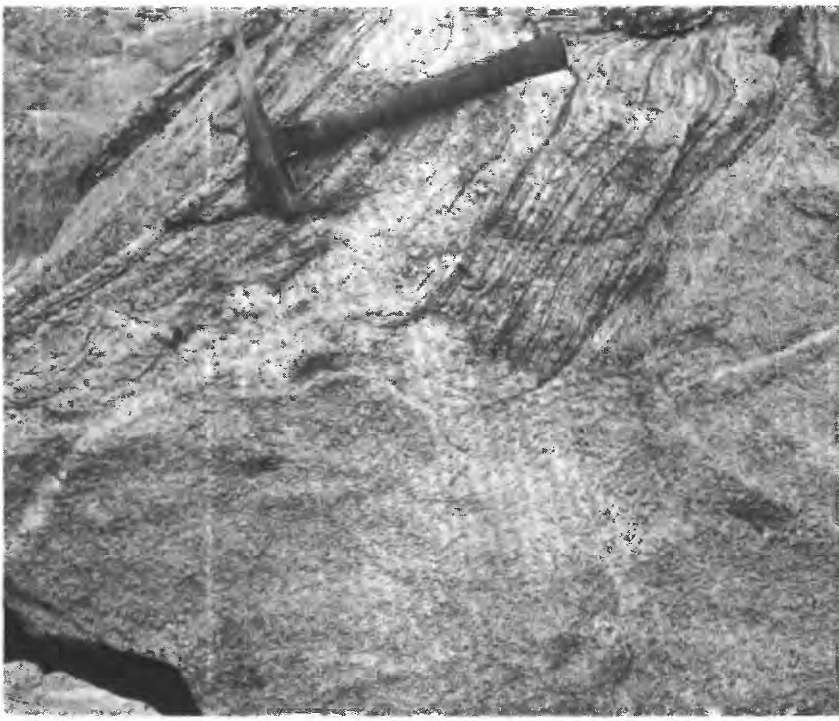

FIGURE 5.—Biotite gneiss granitized by a pluton of the Idaho batholith. Ring Creek cirque.

naked eye, hand specimens of granitized rocks appear igneous, but on the large areas of bare rock, wisps, and ghosts of foliation and layering can be detected. In most places that are extensively granitized, it is not possible to tell which of the gneisses was replaced. Accordingly, all these rocks are included in the areas mapped as gneiss.

ROCKS OF THE BELT (?) SUPERGROUP

In two places, metasedimentary rocks are exposed that have undergone markedly less metamorphism than the gneisses described above. No age or correlation can be unequivocally assigned, but in lithology and general appearance they strongly resemble rocks that have been mapped as formations in the Belt Supergroup farther north (Greenwood and Morrison, 1967).

CALC-SILICATE ROCKS

Diopside-plagioclase gneiss is exposed between Dry Saddle and the head of Sabe Creek along the Nez Perce Trail. In mineralogy, texture, and general appearance it strongly resembles metamorphosed calcareous sediments elsewhere that have been tentatively identified as Wallace Formation. The rocks extend only about a mile into the study area. Their extension to the north was not mapped. On the east the gneiss has been intruded and thermally metamorphosed by igneous rocks. Contact with biotite gneiss on the west was not observed.

QUARTZITE

Biotite quartzite is exposed for about 8 miles along the Salmon River between Campbell Ferry and Blowout Creek. In most of this area the rocks are relatively uniform, even-grained, slightly arkosic quartzite. Thin biotite-rich layers, ¼ to 4 inches apart, parallel the bedding. In texture and lithology these rocks resemble the Prichard Formation to the north and northwest, but parts of other formations of the Belt Supergroup also resemble the quartzite.

No contact between quartzite and gneissic igneous rocks was seen at the north end of the quartzite exposures, but it must be sharp, as indicated by the short distance between outcrops of the two rock types; it may be a fault contact. To the south, the quartzite ends abruptly at Blowout Creek. South from Blowout Creek a variety of schists, gneisses, and igneous layers and lenses make up the rocks between Blowout Creek and Paine Creek. Beginning about one-third of a mile south of Paine Creek and continuing south to Tepee Creek, is a mixture of quartzite and biotite schist, injected by igneous material along foliation planes. South of Tepee Creek these rocks have a gradational contact with muscovite quartz monzonite.

AGES OF THE METAMORPHIC ROCKS

The ages of the metamorphic rocks are not known. The most probable relative ages are shown on plate 1. Their validity hinges on the identity of the quartzite and calc-silicate rocks. If they are correctly identified, the gneissic metasedimentary rocks are necessarily much older than the Belt and it seems reasonable that the gneissic igneous rocks are also older. It seems unlikely that the gneissic igneous rocks could be emplaced under conditions that would produce uniform and all-pervasive gneissic layering without more drastic metamorphism of rocks such as the calc-silicate hornfels. Thus, both gneissic units seem definitely Precambrian in age and may well be older than Belt.

IGNEOUS ROCKS

At least four separate plutons were recognized in the study area. None lie wholly within the area, and they were not seen in contact with each other; thus neither their sizes nor age relationships are known. Nevertheless, textures and compositions are sufficiently distinctive to indicate differences between plutons.

Border zones of the plutons contain gneiss or augen gneiss in places. Granitization associated with emplacement of one or two of the plutons has produced widespread alteration of preexisting rocks. There are places where a continuous gradational sequence can be found extending from massive igneous rock to gneissic border zone, to granitized older rocks, to unmodified older gneisses.

Coarse facies of the plutons tend to be covered by grus in unglaciated areas along ridge crests, whereas the finer grained plutons and metamorphic rocks are generally covered by well-developed soil.

GRANODIORITE

Coarse-grained hornblende-biotite granodiorite underlies more than 40 square miles in the upper Selway River and Cayuse Creek drainages (pl. 1). It is probably part of the same pluton that crops out at Salmon Mountain, and which is known to extend north along the Selway River for several miles in both directions from Magruder Ranger Station. In some unglaciated areas the rock forms bold outcrops, typified by the inselberglike exposures in the Horse Creek drainage (fig. 6). In most places the rock weathers to a distinctive reddish-brown grus.

On the west side of Salmon Mountain the rock grades into porphyritic rock, then to gneissic porphyry and poorly developed augen gneiss. Augen gneiss also crops out along Horse Creek a short distance south of the pluton. On the south side of Salmon Mountain, beginning at the lookout, the granodiorite grades into a coarse-grained hornblende-rich border zone, and from that into lighter colored rock resembling granite. In the cirque about a mile south of the lookout, this granitic material has replaced metasedimentary rocks.

FIGURE 6.—Massive outcrops of hornblende-biotite granodiorite in unglaciated upper Cayuse Creek basin. View toward northeast.

PORPHYRITIC QUARTZ MONZONITE

A distinctive porphyritic quartz monzonite with a granophyric groundmass underlies about 15 square miles in the south-central part of the study area. It is well exposed for about 7 miles along the Salmon River, where the massive, little-jointed rock forms the steepest and most rugged part of the canyon (fig. 7.). This pluton is so resistant to erosion that this part of the canyon contains no gravel terraces and indeed is so steep walled as to be the only part of the canyon without a trail. The stock appears to be separated from other intrusives in the study area.

BIOTITE QUARTZ MONZONITE

At Sabe Mountain and in the headwaters of Sabe Creek, coarse-grained biotite quartz monzonite underlies about 15 square

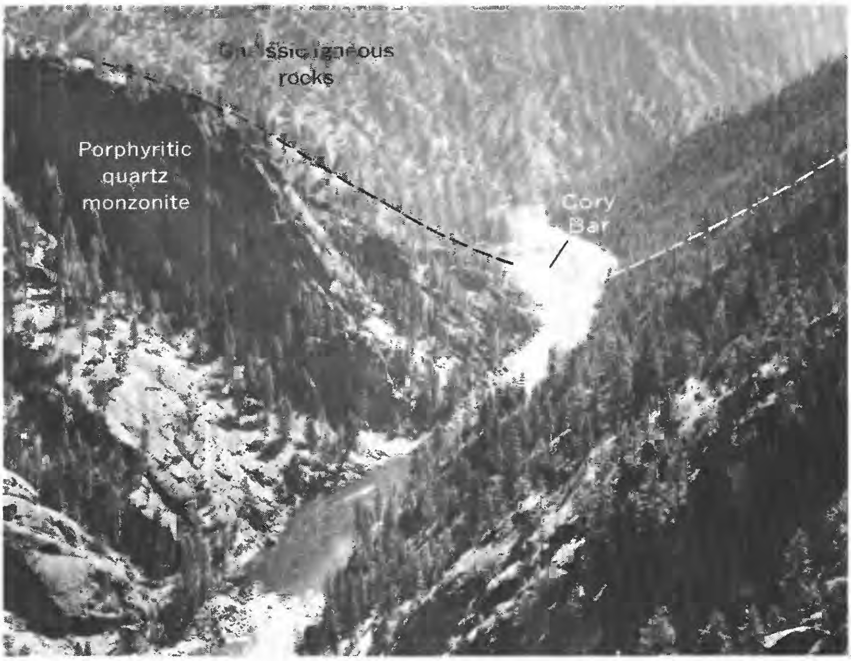

FIGURE 7.—Porphyritic quartz monzonite in the Salmon River Canyon near Salmon Falls. View upstream toward east.

miles. On Sabe Mountain it weathers to a coarse, granular grus. It is cut by numerous fine-grained light-colored dikes, generally less than 3 feet thick, that are probably late-stage magmatic differentiates of the pluton.

In Bargamin Creek drainage, biotite quartz monzonite underlies at least 20 square miles. It is well exposed in upper Cache Creek and along the Nez Perce Trail on both sides of Bargamin Creek. Textures range from coarse in Cache Creek to relatively fine along the road from Bargamin Creek to Dry Saddle and to porphyritic at Dry Saddle. These rocks all appear to be part of the same pluton, however, and are probably also part of the quartz monzonite to the east in the headwaters of Sabe Creek. South of Dry Saddle it grades into gneissic quartz monzonite, and that, in turn, grades into augen gneiss and granitized metamorphic rocks to the south.

MUSCOVITE QUARTZ MONZONITE

The southwest tip of the primitive area is underlain by a medium-grained muscovite quartz monzonite that was observed only along the Salmon River trail. The rock appears to have intruded gneiss with relatively little deformation but with some assimilation. The contact zone exposed along the trail is gradational over a distance of about a quarter of a mile.

DIKES

A variety of dikes are exposed in the Salmon River Breaks Primitive Area. Most are too small to be shown on the map; the rhyolite dike that extends southwest from Boston Mountain is a notable exception (pl. 1). Most of the dikes are less than 50 feet thick, but on Stripe Mountain and Harrington Ridge some are as much as 200 feet thick. They range from dacite to rhyolite in composition. They are typically porphyritic, having phenocrysts of quartz and feldspar in a dark aphanitic groundmass. On many of the higher ridges rocks from the dikes form blocky boulder fields devoid of vegetation.

The dikes occur mainly in the older gneisses; they are sparse or absent in granitized rock and plutons. They generally parallel the strike, but not the dip, of the gneissic layering. In general appearance they resemble some of the dikes of Tertiary age described by Ross (1934, p. 60–65). In the Salmon River Breaks Primitive Area, ages of the dike rocks are not clear, though the rhyolite dike at Boston Mountain appears to have intruded both the gneiss and the quartz monzonite, and thus it may be the youngest rock in the study area.

AGES OF THE IGNEOUS ROCKS

No precise ages can be assigned to the igneous rocks in the study area. The plutons are presumably part of the Idaho batholith, but recent work has shown that plutons considered to be Idaho batholith were emplaced over a long period of time. McDowell and Kulp (1969) reported potassium-argon ages ranging from 38 million to 125 million years for rocks generally considered to be part of the batholith, and Larsen, Gottfried, Jaffe, and Waring (1958) reported lead-alpha ages ranging from 60 million to 135 million years on plutons within the Idaho batholith. None of the plutons in the Salmon River Breaks Primitive Area have been dated but their ages probably fall within the limits just stated.

The age of the dikes is likewise not well known. The contact between the large rhyolite dike on Boston Mountain and the quartz monzonite of the Bargamin Creek pluton is not exposed. Elsewhere smaller dikes were seen cutting metamorphic rocks, but none were noted that cut any of the plutons. The dike rocks are lithologically similar to Tertiary dikes described in other parts of central Idaho (Ross, 1934), but beyond the likelihood that they are Tertiary, little can be said regarding their age.

GLACIATION

Ridges higher than 7,000 to 7,200 feet had permanent snowfields on their north and northwest sides during the late Pleistocene, and ridges higher than 8,000 feet supported active glaciers. Most south- and southwest-facing ridges show no evidence of glaciation below 8,000 feet and little above that elevation.

Glaciers from higher centers of accumulation flowed mostly eastward down preexisting valleys, carving them to well-developed U-shapes down to elevations of about 6,000 feet. The lowest recognized ice terminus was at about 5,000 feet in the valley of Ring Creek, a tributary of Sabe Creek.

Moraines are small and thin and occur mostly as remnants of lateral moraines in the lower parts of a few valleys. Best examples are along streams that drain the east side of Stripe Mountain. Terminal and recessional moraines are almost entirely lacking. Because the moraines are small and of no economic value, they were not mapped. Cirques are moderately steep walled, but only a few on the highest peaks are major obstacles to foot travel. Many cirques contain lakes which, so far as is known, are all in rock-enclosed basins (fig. 8).

FIGURE 8.—Sheep Spring Lakes: rock-enclosed basins in a northwest-facing cirque between Sabe Creek and Bargamin Creek. View to the south.

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All glacial features in the study area are fresh. Little or no weathering has occurred on glaciated surfaces, moraine remnants still support undrained depressions, and many undrained depressions contain water rather than silt or vegetation. Furthermore, no evidence for multiple stages, or even for minor readvances during recession, was noted. This apparently youthful, simple glacial history is in contrast to other parts of central Idaho (Ross, 1930).

The absence of older glacial features may be the result of more extensive younger glaciation that eliminated the older deposits, or it may be because no earlier glaciation took place. Topography suggests a third possibility. The entire Salmon River Breaks is an area of deep, steep-walled canyons and relatively narrow ridges. In an area of such steep gradients, evidence of older glaciation may simply have been eroded away.

It may be possible to either confirm or correct the age suggested for existing alpine glacial deposits by a study of the gravel bars along parts of the Salmon River Canyon. In places tributaries dumped large quantities of gravel into the main stream, building bars that are locally 20 to 50 feet thick and as much as a quarter of a mile long. These bars may have formed during periods of increased flow from tributaries. Those periods may coincide with periods of glacier advance on the ridges. Freshness of the material in the bars suggests that the deposits are late Pleistocene in age. Since the period or periods of deposition, the Salmon River has been reexcavating its canyon and has cut through several of the bars to reexpose the old bedrock floor of the canyon. Such bars can be seen at the mouths of Rattlesnake Creek, Bargamin Creek, Bear Creek, and Big and Little Squaw Creeks.

AEROMAGNETIC SURVEY

By W. E. Davis, U.S. Geological Survey

An airborne magnetometer survey of the region between lats 45°20′ N. and 45°45′ N. and longs 114°30′ W. and 115°30′ W. was made by the U.S. Geological Survey to assist in evaluating the mineral potential of the primitive area (pl. 1). Total intensity magnetic data were obtained along north-south lines flown about 1 mile apart at an average barometric elevation of 11,000 feet above sea level. The data were compiled at a scale of 1:125,000 and a contour interval of 20 gammas relative to an arbitrary datum. Sources of the magnetic features, interpreted from results of geologic mapping and general knowledge of the magnetic properties of rocks involved, are discussed briefly below.

The aeromagnetic map shows a broad zone of moderately high magnetic intensity along the northwestern margin of the area; a prominent positive anomaly centered over the junction of Sabe Creek and the Salmon River; and local highs of small amplitude superimposed on a pronounced northeastward magnetic gradient in the east part of the area. The magnetic pattern includes a general northeastward increase in total magnetic intensity that is mostly the effect of the earth's main magnetic field. In this area the earth's field increases at a rate of about 8 gammas per mile in a N. 22° E. direction.

The high-intensity zone extends west from Bargamin Creek to Red River and then swings southwestward toward Dixie. Within this zone are Precambrian sedimentary and metamorphic rocks, intruded by quartz monzonite and granodiorite of the Idaho batholith, and extensive outcrops of intrusive rocks probably related to the batholith in the northwest part of the study area. Contour closures indicate several magnetic maximums that are associated mainly with exposed intrusive rocks. The large magnetic maximum near the head of Bargamin Creek, which was not completely mapped geologically, is attributed to intrusive and metamorphic rocks in the upland southeast of Red River Hot Springs. These rocks are apparently more magnetic than the quartz monzonite and granodiorite of the study area, but they have not been mapped, and their composition is unknown.

A weak magnetic high is indicated by undulations in the contours on the south flank of the magnetic high near the head of Bargamin Creek. This weak high is evidently caused by quartz monzonite and younger dike rocks in the upland west of Bargamin Creek. Very likely the dike rocks are the dominant source of the weak anomaly.

To the east a small contour closure occurs near Burnt Knob. Undulations in the contours indicate that this feature is part of a narrow high which extends more than 6 miles southward to Ring Creek Point. The anomaly may be caused by metamorphic rocks or narrow intrusive bodies near the crest of the mountains.

General low magnetic relief suggests that only minor magnetic contrasts occur in the Precambrian gneiss, metasedimentary and metaigneous rocks in the upland southeast of Bargamin Creek.

The positive anomaly near the mouth of Sabe Creek continues southwestward for several miles. It is associated with porphyritic quartz monzonite along the lower part of Sabe Creek and with granodiorite in the upland south of the Salmon River.

In the northeast part of the area, a positive anomaly near Salmon Mountain is attributed to a narrow body of granodiorite that extends southward from the outcrop of granodiorite, beneath the metamorphic rock cover.

The southeastern anomaly includes granodiorite on Square Top and Precambrian basement rocks along the upper reaches of Horse Creek. It is probably caused mostly by high-grade metamorphic rocks. The higher altitude of dioritic rocks on the mountain very likely contributes to the anomaly.

MINERAL RESOURCES

By Paul L. Weis and Leonard J. Schmitt, Jr., U.S. Geological Survey, and
Ernest T. Tuchek, U.S. Bureau of Mines

The objective of this project was an appraisal of the mineral resource potential of the Salmon River Breaks Primitive Area and certain adjacent areas. The U.S. Geological Survey was responsible for the search for previously unrecognized mineral occurrences; the U.S. Bureau of Mines, for investigating the placer deposits and the known bedrock mines and prospects. Particular effort was made to recognize those bedrock mineral occurrences that early prospectors overlooked, were unable to detect, or could not use. Extensive attention was directed to the potential placer ground along the Salmon River, which has been worked intermittently for nearly a hundred years.

The principal commodities found in the study area are gold and fluorspar, and the only commodity known to have been won from the area is gold. There are occurrences of other commodities, but none appear to be present in significant concentrations, nor is there any record of production of them from this area.

More than one-third of Idaho's total gold production has come from within 50 miles of the Salmon River Breaks Primitive Area. The gold camps of Elk City, Orogrande, Tenmile, Dixie, Florence, Buffalo Hump, Warren, and Burgdorf lie in a broad northeast-trending belt that at one point is within 2 miles of the primitive area boundary. In fact, the straight and sharply defined east boundary of the gold belt suggests geologic control by some as yet unrecognized structure. The Salmon River Breaks lies east of the belt's east boundary and the primitive area has produced very little gold. Placers have been worked on some of the gravel bars along the Salmon River, but only during major economic depressions. Minor amounts of gold are rumored to have come from the Painter mine, whose workings lie partly inside the extreme southwest corner of the area.

METHODS OF STUDY

Stream-sediment samples were taken from streams and drainages of the area during geologic mapping. All major streams were traversed, and samples of stream sediments were collected at intervals on them and at the mouths of all their tributaries.

Traverses also were made along all of the major ridges and many of the minor ones, and representative samples of veins, altered or mineralized rock, and principal rock types were collected for further study and analysis. In addition, air searches for evidences of rock alteration or mineralization were routinely made during the helicopter flights to and from each day's work area. Gravel of all the larger streams was panned and the concentrates were analyzed (pl. 2).

All 507 sediment samples were analyzed for citrate-extractable heavy metals (CxHM of table 1), and 175 of them were also analyzed for cold-extractable copper (CxCu of table 1). All samples were analyzed for 31 elements by the six-step semiquantitative spectrographic method (table 1, follows "References Cited"). Anomalies found were rechecked with a portable analytical kit.

Bureau of Mines personnel inspected Idaho and Lemhi County Courthouse records to determine the number of mining claims and their locations within the primitive area, examined mining claims and known mineral deposits, and made brief mining and marketing analyses of the mineral commodities of the area. Fluorite was the only commodity of current significance recognized in the primitive area.

More than 200 mining claims have been located in the study area since 1894. Eighty percent of the mining claims are placer locations along the Salmon River. Consequently, much of the Bureau's work was devoted to appraisal of the placer deposits.

EVALUATION OF GEOCHEMICAL SAMPLE DATA

Heavy metals and cold copper analyses of the stream sediments revealed only sparse mineralization. In 507 samples, the highest heavy metals value was 70 ppm (parts per million) in sample N–224 (table 1) from a stream draining an area that for many years had been used as a Forest Service base camp. Metals left from this activity probably caused the anomaly. Eight samples contained 20–30 ppm heavy metals; eleven contained 10–19 ppm. Only eight samples from Smith Gulch showed anomalous amounts (20–40 ppm) of cold-extractable copper.

Areas where anomalous amounts of heavy metals or copper were found were revisited and resampled. In many of these areas it proved impossible to duplicate the original anomalous values, which are therefore believed to be spurious. Spectrographic analyses of original and duplicate samples gave further evidence that no unusual amounts of metals were present at those localities.

Exceptions to the above were found in Smith Gulch and part of Big Squaw Creek valley, the drainages on opposite sides of Prospect Ridge. Resampling in both drainages showed anomalous amounts of copper or heavy metals. The only mineralized area found in these drainages was discovered on the crest of Prospect Ridge about 1,500 feet above the Salmon River and due north of the Big Squaw Creek fluorspar deposit.

The mineralized rocks on Prospect Ridge crop out in an area about 200 feet by about 50 feet. The effects of mineralization are confined to a bleached and silicified dike and associated skarn developed in calcareous gneiss. The only visible metallic minerals are secondary copper silicates and carbonates that thinly coat fracture surfaces. Spectrographic analyses of selected hand specimens contained as much as 1½ percent copper, 1 percent zinc, 200 ppm lead, 500 ppm tin, 30 ppm silver, and 70 ppm cobalt (samples M–310, M–317, and M–318, table 1). The mineralized area is spotty and irregular, and the occurrence does not appear to be of economic significance.

Spectrographic analyses showed beryllium in unusual amounts in three localities. A single sample (M–255, table 1) of granitized rock collected on the ridge west of Saddle Lake contained 30 ppm beryllium. Three stream-sediment samples from a part of the Salt Creek drainage underlain by quartz monzonite contained 7–15 ppm beryllium (samples N–268, N–269, and N–270, table 1). Two samples of quartz-fluorite vein material from Big Squaw Creek fluorspar prospect contained 5–7 ppm beryllium (samples M–321 and M–322, table 1). No beryllium minerals were recognized at any of these localities.

ECONOMIC APPRAISAL

By Ernest T. Tuchek, U.S. Bureau of Mines

LODE DEPOSITS

GOLD

Consumption of gold has increased in recent years, especially in industrial and defense applications. In 1969, 6.7 million troy ounces were used in arts and industries of the United States, but domestic mine production was only 1.7 million troy ounces (U.S. Bureau of Mines, 1971, p. 522). The New York free market price averaged $42.19 in 1969.

The resource base of the domestic gold mining industry has been depleted by more than 100 years of intensive exploitation, when most of the high-grade, easily accessible ore was mined. Domestic consumption of gold in the arts and industries has exceeded domestic mine production since 1957, and the unfavorable gap between domestic production and consumption continues to widen. As a result, a continued price rise is expected until supplies from other sources or substitution of alternate materials achieves a balance.

Principal gold-producing countries and percentage of world production in 1969 are as follows:

Republic of South Africa	66
Communist bloc	14
United States, Canada, and Australia	11
Other free-world countries	9

Gold placer deposits in the primitive area would require a value of more than $0.60 per yard to be minable at a profit. With one exception, none of the deposits sampled during this examination approached this figure, even for small yardages. The known lode gold deposits cannot be economically mined under present conditions.

PAINTER MINE

The Painter mine is in sec. 15, T. 24 N., R. 8 E., and includes claims on both sides of the river near the mouth of Jersey Creek. Access to the mine from Grangeville, Idaho, the nearest railhead, is by State Highway 14 to Elk City, then southward on U.S. Forest Service roads 222 and 311 to Mackay Bar via Dixie, then upriver for 3 miles on a jeep road—a total distance of 90 miles. The access route crosses Jack Mountain Pass and Jersey Mountain Pass, 6,400 and 6,800 feet elevation, respectively; snow normally limits use to the period June 1 through October 15. Mine reactivation would require considerable improvement of the last 9 miles of the road which would need widening and alleviation of grade and sharp switchbacks. This work would entail major blasting.

The property is in the bottom of the precipitous Salmon River canyon. The terrain is rough and in places the canyon walls are nearly vertical. The soil is thin and patchy, leaving abundant exposures of country rock. The local vegetation is predominantly grasses with Ponderosa pine, mountain-mahogany, and buckbrush scattered throughout. Mine workings are found from the river's edge to several hundred feet above the river on the sides of the canyon.

The Painter mine consists of four contiguous, patented lode claims, the Surprise Nos. 2 through 5. The property is owned by Robert V. Hansberger of Boise, Idaho. An adjoining homestead claim is described as a placer in a following section.

The Painter mine is the largest mine working in the study area (fig. 9). Work ceased with advent of World War II and subsequent order L–208 of the War Production Board. Apparently the mill was in operation for only a few months prior to the shut-

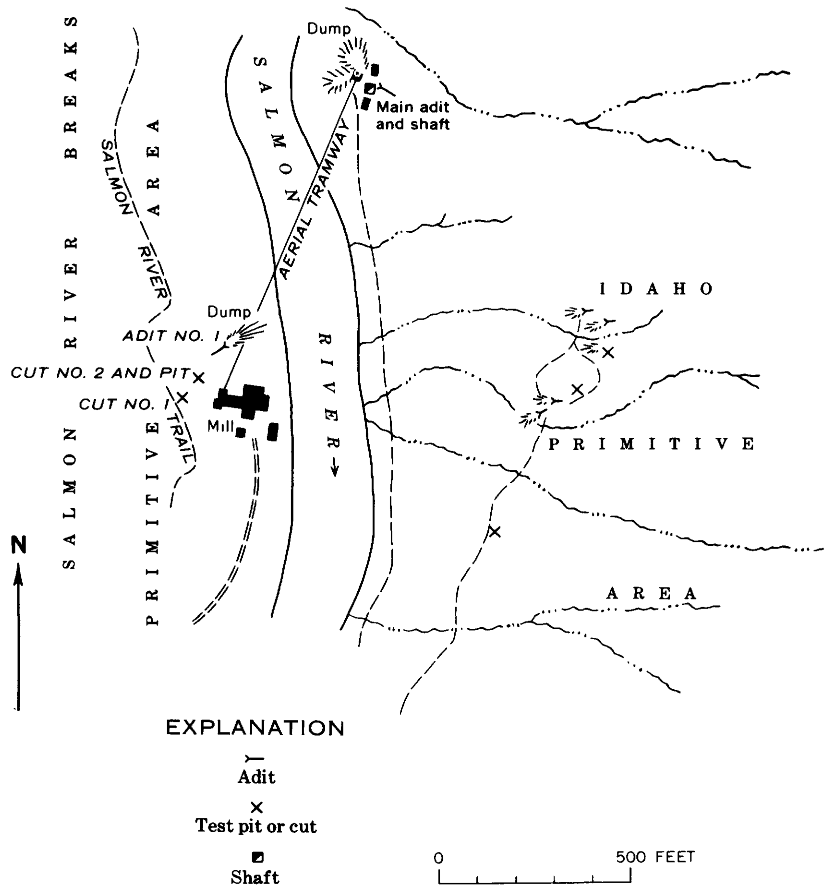


FIGURE 9.—Map of the Painter mine (sec. 15, T. 24 N., R. 8 E.) showing location of adits, test pits and cuts, and shaft.

down. Improvements on the west side of the river consist of a mill, a shop, an oil storage shed, an adit 188 feet long, two small opencuts, and a 6-foot-deep pit. An aerial tramway connects the mill building to an ore bin on the east side of the river. Other improvements on the east side of the river are a shaft, headframe, hoist house, two shops, five adits, and three cuts. Only those improvements located on the west side of the river are within the Salmon River Breaks Primitive Area. The main production was reported to have come from a shaft on the east side of the river, which is in the Idaho Primitive Area; the shaft was flooded and could not be examined.

The country rock is a medium-grained quartz monzonite intruded by abundant andesite dikes. These dikes trend generally east and dip south. Dikes exposed by the workings range in width from less than 1 foot to 20 feet.

On the west side of the river, the workings explored quartz lenses in weak, narrow shear zones that cut quartz monzonite. A quartz vein and shear zones are exposed in the adit and a second quartz vein is exposed in the three opencuts above.

Adit No. 1 is 188 feet long and is caved at two places, but the face is still accessible (fig. 10). At the portal a gray quartz vein up to 4 inches wide is bounded by shear planes in white quartz. The vein strikes N. 50° E. and dips to the southeast; it extends for 10 feet and pinches out where the two shear planes merge. The gray quartz vein contains as much as 3 percent limonite, hem-

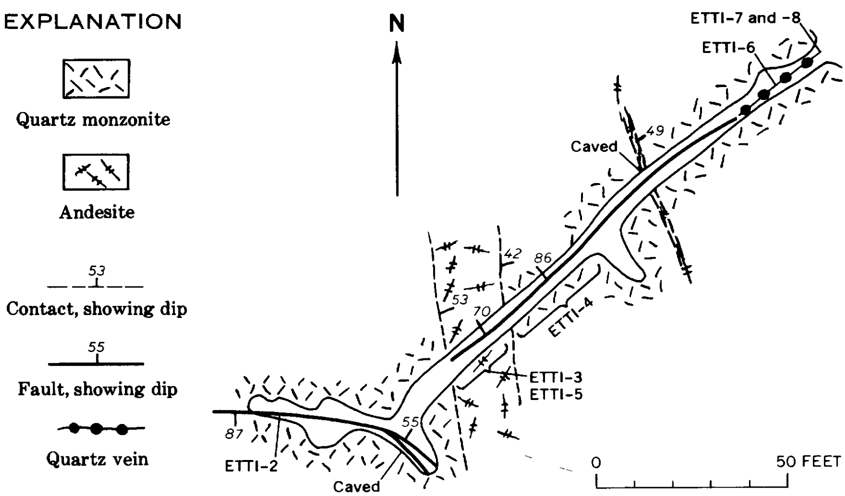


FIGURE 10.—Map of adit No. 1, Painter mine, showing sample localities (ETTI-2). Location of area shown in figure 9.

atite, and pyrite. The white quartz is stained with manganese oxide and it pinches out in the adit 26 feet from the portal. At the portal, the white quartz on the north side of the gray quartz is 20 inches wide, and that on the south side is 16 inches wide. A sample from the gray quartz taken at the portal assayed a trace of gold and 1.08 ounces of silver per ton. Other samples from the adit contained only a trace of gold and less than 0.05 ounce silver per ton.

Cut No. 2, 125 feet southwest from the portal (fig. 11), is 10 feet across and 3 feet deep. The vein at the cut is 9 inches wide and is exposed along a strike distance of 4 feet. The vein strikes N. 62° E. and dips 78° NW. It is composed of manganese-stained white quartz and extends 14 feet northeast to the 6-foot-deep pit where it is 8 inches wide, and it probably extends to sloughed cut No. 1 for an intermittently exposed strike length of 104 feet and an intermittently exposed depth of 26 feet. A sample of the vein from cut No. 2 assayed 0.36 ounce gold and 0.17 ounce silver per ton.

The mill building is standing but the main supporting timbers and beams have rotted. The shop and storage shed are also in an

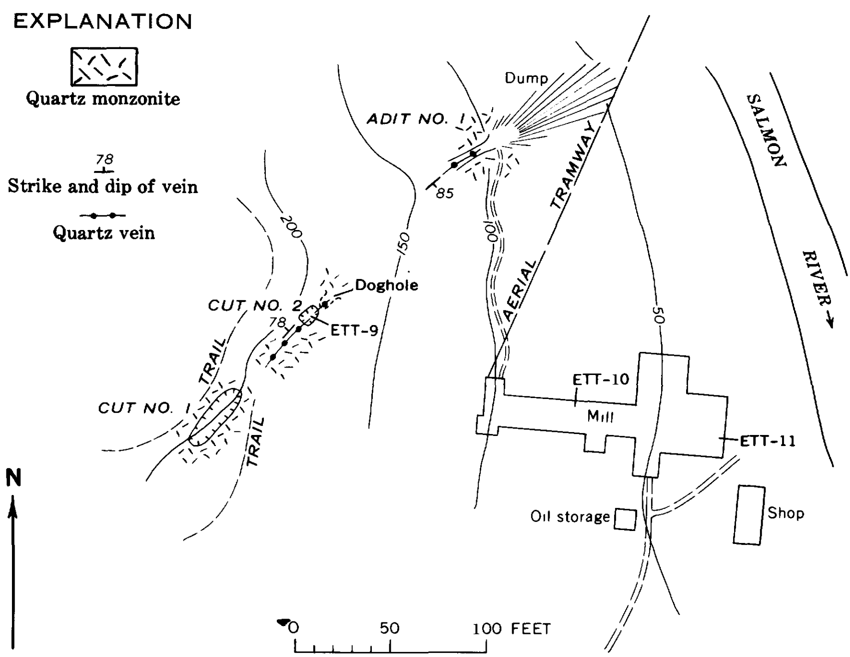


FIGURE 11.—Map of the mill area, Painter mine, showing sample localities (ETT–9). Location of area shown in figure 9. Datum is arbitrary.

advanced state of deterioration. Machinery on the premises is in bad repair and most could not be put back into operating condition. A flowsheet of the mill is as follows:

Ore bin
↓
12′×16′ jaw crusher
↓
Ore bin
↓
Chilean mill
↓
5′ ball mill
↓
16′×2′ rake classifier
↓
Amalgamation plates
↓
Flotation cells

A sample from the primary ore bin consisted of gray quartz with minor hematite and limonite. It assayed 0.16 ounce gold and 0.05 ounce silver per ton. A second sample from a small bin that contained flotation concentrates assayed 2.31 ounces gold and 1.72 ounces silver per ton.

The part of the property within the study area probably has no potential for development, because the shears and associated small amounts of mineralized material are discontinuous and there are no indications of improvement with depth.

EAGLE CREEK QUARTZ DEPOSIT

Several small quartz lenses crop out on a ridge crest between Fawn and Eagle Creeks in the E½ sec. 15, T. 24 N., R. 13 E., about one-half mile north of the river. The deposit may be reached from the Salmon River by a poor trail.

The largest lens is about 1,500 feet above the Salmon River. It strikes northward, dips nearly vertically, and was traced for 30 feet across the ridge crest. The quartz is drusy and quartz crystals as much as one-half of an inch long line the voids. Minor feldspar gives the lens a pegmatitic appearance. A 5-foot sample taken across the widest part of the lens contained a trace gold and 0.20 ounce silver per ton. Apparently, minor prospecting has been done on the lens; however, the county records show no entry of a lode claim in this locality.

CHURCHILL CREEK PROSPECT

This prospect is on a small ridge crest near the Salmon River, about 150 yards downriver from the mouth of Churchill Creek, in the NE¼ sec. 11, T. 25 N., R. 9 E. It can be seen from the Salmon River trail, which is 60 feet to the south.

Four sloughed prospect pits in a distance of 70 feet have been dug along the crest of a small northward-trending ridge. Each is about 10 feet long and 5 feet wide. Bedrock is not exposed; however, dump material from the pits consists of andesite and pegmatite. The pegmatite consists of feldspar, quartz, muscovite, and hornblende. A composite sample of selected pegmatite from the dumps of three pits contained no gold and 0.05 ounce silver per ton. County records do not show that lode mining claims have been filed for this locality.

BOISE CREEK PROSPECT

Two old prospect pits are a short distance above the Salmon River trail near Boise Creek in the NW¼ sec. 11, T. 24 N., R. 8 E. They are each approximately 5 feet long, 10 feet in diameter, and sloughed nearly full. Dump material consists of andesite, aplite, and pegmatite. The pits are on a line that trends N. 60° W., presumably along the strike of a pegmatite dike. Pegmatite from the dump contains feldspar crystals up to 1½ inches across. A sample of the material contained only a trace of gold and no silver.

BURNT STUMP GROUP AND ALTA GROUP LODES

These groups of claims consist of eight lodes—Burnt Stump 1, Three Pards, Rain Water, Big Mac, Little Kirk, Stake Nancy, Fay, and Alta—and are reported to be located one-half to three-fourths mile northwest of the Colt Creek-Horse Creek junction, in secs. 10, 11, 14, and 15, T. 24 N., R. 14 E. (See fig. 12). The claims were located by Wade E. Chaffin, Roy Murray, and Armand Brazil during 1961. Workings were found in the general area but the claims could not be identified on the ground. The area can be reached from the Salmon River by going 4 miles up the Horse Creek trail to Colt Creek, then northwestward one-half to three-fourths of a mile by poor trail.

Several small pegmatite dikes are located on the east flank of the major northwest-trending ridge between West Horse Creek and Colt Creek (fig. 12). The country rock grades from a biotite gneiss to a quartz-plagioclase-microcline-biotite gneiss.

Three pegmatite dikes have been extensively prospected by a series of small shallow pits. The pits are old and all but two have

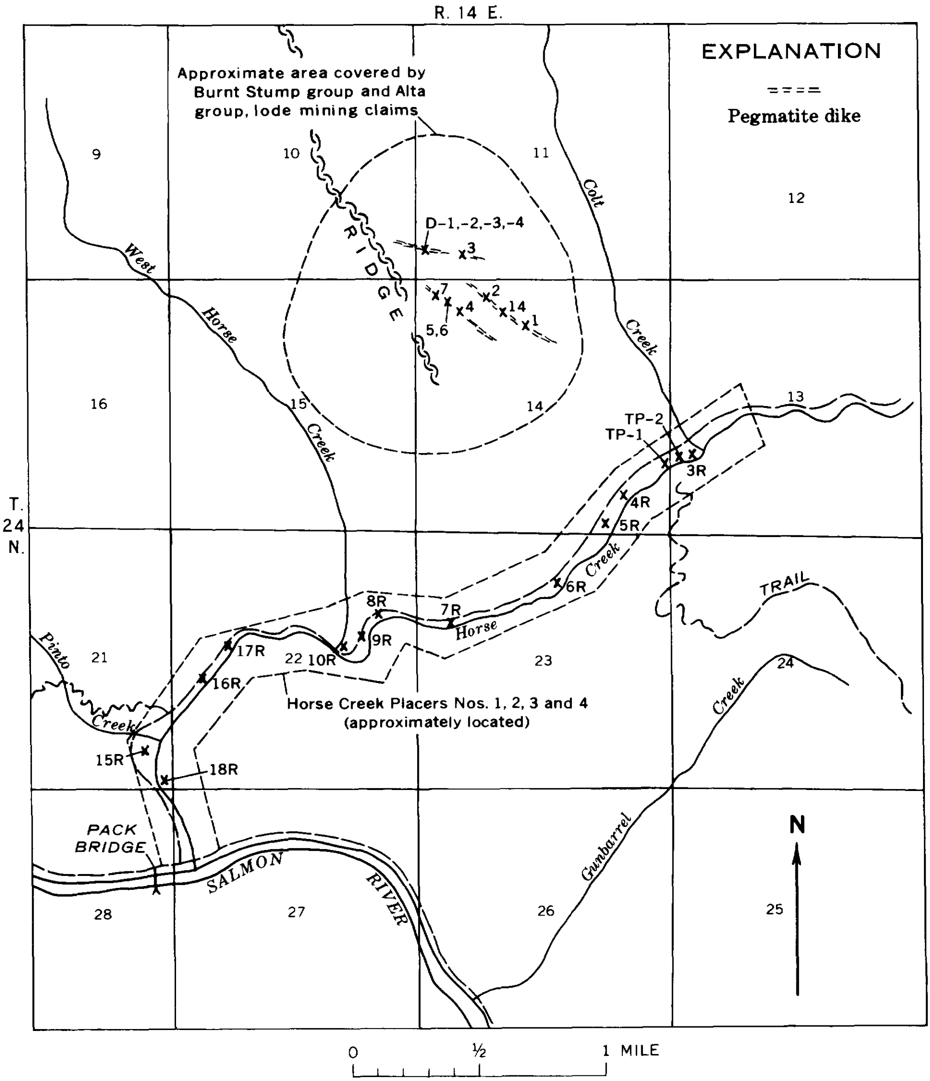


FIGURE 12.—Map showing location of mining claims in the Horse Creek drainage, sample localities (D–1; 4; 4R) and test pits (TP–1).

sloughed. Two of the dikes are exposed intermittently along a strike distance of one-fourth of a mile and the third dike is exposed for a distance of one-eighth of a mile.

The dikes vary in width from 1 to 2½ feet and contain large crystals of quartz and feldspar. Quartz and feldspar crystals up to 3 inches long are common. Quartz makes up 10 to 60 percent of the rock. Muscovite and biotite are minor accessory minerals.

Twelve samples were taken of the dikes. Some were taken from rock in place and the others were taken selectively from the dumps. Analyses showed nothing of economic value.

FLUORSPAR

Fluorspar is used mainly in the petroleum, aluminum, steel, ceramic, and plastic industries. Although the United States has been the world's largest fluorspar producer, domestic consumption far exceeds output and approximately 80 percent of the amount needed is imported. Consumption totaled 1,243,414 short tons of fluorspar in 1968; domestic production amounted to only 252,411 short tons (U.S. Bureau of Mines, 1971, p. 515). In January 1971, the price of domestically produced fluorite ranged from $43 to $77, depending on grade. Most of the fluorspar is mined in an area along the Ohio River in southern Illinois and western Kentucky; this district also contains most of the domestic reserves. Italy, Mexico, and Spain are the principal foreign sources.

Current estimates are that known domestic fluorspar reserves will approach depletion in 25 to 27 years; nevertheless, intensified exploration coupled with moderate price increases is expected to provide additional reserves (U.S. Bureau of Mines, 1970). A shortage by 1973 has been predicted by an industry representative (Montgomery, 1970, p. 142).

One fluorite deposit, the Big Squaw Creek deposit, is known in the primitive area.

BIG SQUAW CREEK FLUORSPAR DEPOSIT

The Big Squaw Creek fluorspar deposit, also known as the Smothers property and the Noussan mine, is in sec. 27, T. 25 N., R. 12 E., Idaho County, and consists of claims on both sides of the Salmon River between Big Squaw Creek and Smith Gulch (fig. 13). It is about 18 miles downriver from the end of the road at Corn Creek and can be reached by packtrail along the river or by jet boat. It may also be reached by a 15-mile packtrail through the rugged terrain south of the Nez Perce Trail.

The deposit is in the bottom of the precipitous Salmon River Canyon. The terrain is rough and in places the canyon walls are nearly vertical. The soil is shallow and commonly absent; bold outcrops of country rock are present. The sparse vegetation consists of scattered timber and native grasses.

The property was investigated during World War II by C. P. Ross (U.S. Geological Survey) and by J. A. Herdlick (U.S. Bureau of Mines). Much of the following description is based on their unpublished data.

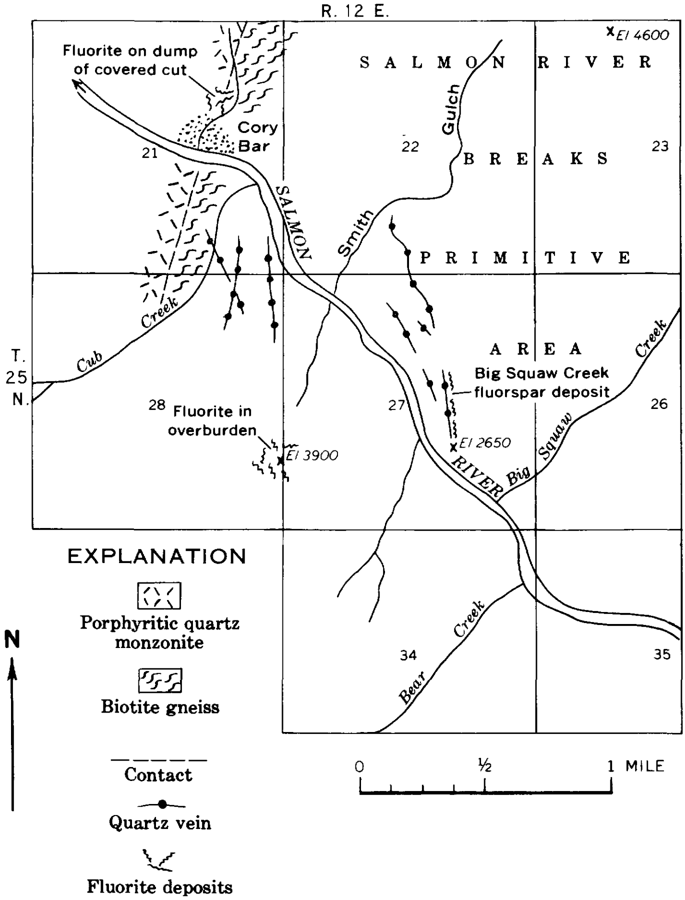


FIGURE 13.—Map of the Big Squaw Creek area showing location of fluorspar deposits.

The large quartz veins associated with the fluorite were discovered in 1860 by prospectors traveling to Leesburg, Idaho, and were prospected for gold. In 1937, Jaffet and Hugo Noussan staked 10 claims on the east side of the river and six on the west. These claims were later allowed to lapse.

During 1948, Austin P. and Florence Smothers located 18 claims covering the principal deposits. In 1955, the claims were purchased by Ernest C. Ecklesdafer. Later the property was acquired by the Squaw Creek Mining Co. and during 1957, by Idaton, Inc. Idaton, Inc., subsequently located 30 additional claims in the area. Exploration under a Defense Minerals Exploration Administration (DMEA) contract was conducted in 1957 and 1958.

Geologic mapping, trenching, sampling, and 700 feet of diamond drilling in two holes were done under contract. This work is described in a final DMEA report. Additional exploration was done by the owners. In the early 1960's Don L. Smith, North Fork, Idaho, located new claims and relocated others covering the principal deposits. There is no record of any production from the property and there are no mining facilities at the claims.

The rocks in the area are mostly gneissic quartz monzonite, biotite gneiss, and small irregular bodies of pegmatite and aplite. In places banding suggests that the gneiss is a metamorphosed roof pendant of sedimentary rocks, the banding representing remnants of the bedding in the original rock. According to C. P. Ross the banding strikes N. 55°–75° W., and dips 80° NE.

Quartz veins are numerous along a broad and very persistent zone of fracturing in the biotite gneiss. This fractured zone strikes N. 10°–15° W. Some of the veins are large and crop out conspicuously. Although most of the veins contain some fluorite, the only known deposit of commercial grade and minable width is the Big Squaw Creek or Smothers fluorspar deposit on the northeast side of the river.

The Big Squaw Creek deposit consists of three ore shoots on the hanging-wall (east) side of a persistent quartz vein which strikes N. 10° W. and dips 60° E. (fig. 14). It has been traced for more than 2,000 feet on the surface and varies from narrow anastomosing stringers to massive quartz bodies as much as 25 feet across. The quartz is white but surface exposures and numerous fractures are stained by iron oxides. The quartz contains abundant vugs lined with quartz and fluorite crystals. Diamond drilling done under the DMEA contract indicates that the vein flattens with depth. Fluorite is present as small stringers within the quartz as well as in three sizable ore shoots along the hanging wall. It occurs in both massive and coarse granular forms. It grades from transparent and colorless to translucent and light green and purple. The granular variety is cemented by a hard matrix of iron oxide-stained clay. No. 1 ore shoot, the largest and southernmost, is about 600 feet long and up to 12 feet wide on the surface. The average width of the shoot throughout the distance of 600 feet is 7.2 feet. Samples from 12 channels that range in length from 1.2 to 12.2 feet were cut across the fluorite zone. They indicate an average grade of 67.50 percent CaF_2. This ore shoot appears to pinch out at fracture intersections on each end. The diamond drilling under the DMEA contract indicates that the zone extends to a depth of at least 330 feet downdip but may

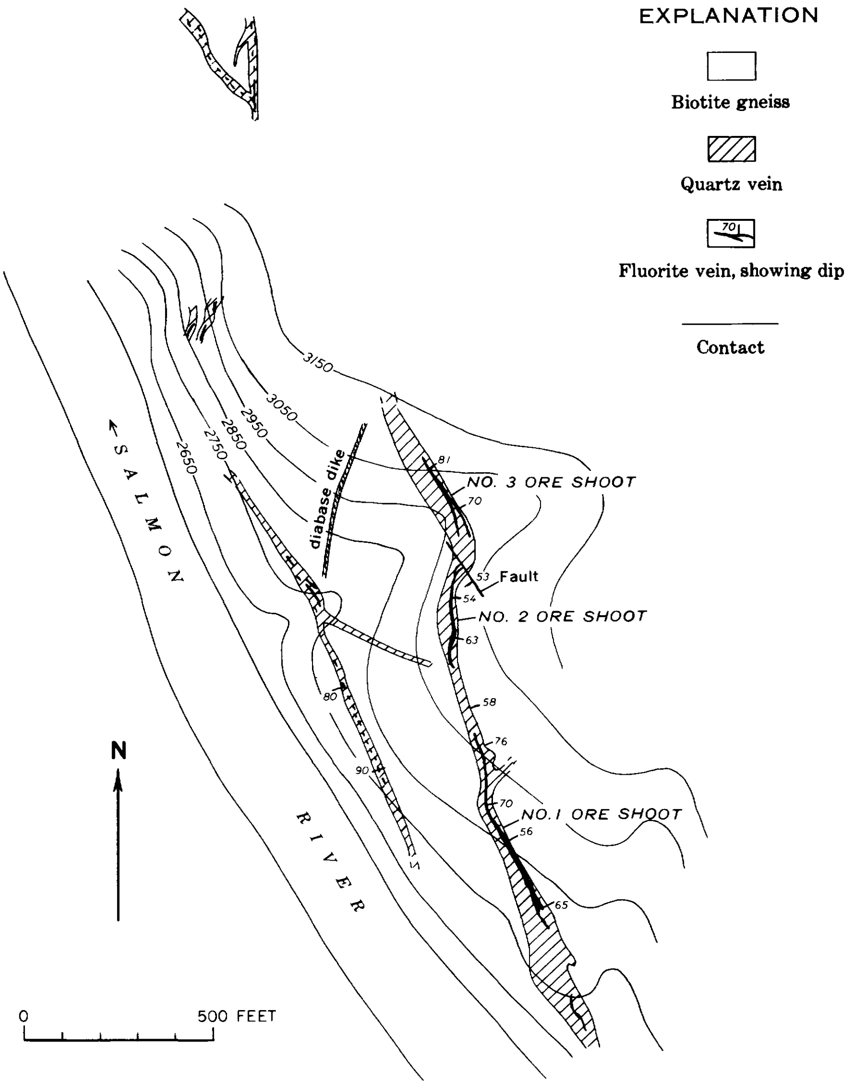


FIGURE 14.—Map of the Big Squaw Creek fluorspar deposit. Modified from DMEA file report.

decrease in grade to about 20 percent CaF_2 at this depth. The No. 2 ore shoot, about 250 feet north, is about 260 feet long and up to 13 feet wide on the surface. The average width is 7.9 feet. Samples have been taken from eight channels, ranging in length from 1.5 to 13.0 feet across the shoot. The average grade of the eight channels is 73.93 percent CaF_2. At the south end the ore shoot terminates in a fractured quartz breccia. On the north end it is faulted out. A 24-foot-long crosscut to this body has exposed a width of 5 feet of fluorite at the face.

The No. 3 ore shoot is about 220 feet long and up to 14 feet wide. The average width is 7.1 feet. Samples from five channels 1.7 to 14.2 feet long across the shoot indicate an average grade of 70.50 percent CaF_2. Several narrow erratic stringers of fluorite beyond the north end of this shoot towards Smith Gulch pinch out within short distances.

A second parallel quartz vein occurs between the main vein and the river. This vein is up to 30 feet wide and can be traced for about 1,100 feet. It contains numerous small stringers and a few very small pods of fluorite.

Similar quartz veins are reported to occur on the west side of the Salmon River but the only fluorite known is in float and in a few short narrow stringers.

The total reserves are estimated to be about 100,000 tons of indicated material containing 70 percent CaF_2. This material is submarginal because of the remote location of the property. A cost analysis indicates that on-the-spot concentration to acid grade would be more feasible than direct shipping of fluorite-bearing rock as metallurgical-grade ore. The costs, however, of mining, milling, transportation, and road construction would be in the range of $75 to $80 per ton of concentrate. The concentrate has a value of only $67 per ton at the nearest market.

PLACER DEPOSITS

Placers are alluvial gravel deposits containing concentrations of gold or other valuable minerals. Alluvial terraces and low-lying gravel bars have been formed along the Salmon River and contain gold and other heavy minerals. Courthouse records show that during the last 80 years nearly all of the Salmon River valley within the study area has been held under placer claim locations. Evaluation of these properties included investigation of small high-grade deposits—potential one- or two-man operations—as well as investigation of the larger terraces and low-lying gravel bars (fig. 15, table 2). Federal and State laws and regulations concerning pollution, restoration, and administrative withdrawals will be a major factor affecting possible future development of these deposits. The U.S. Forest Service has administratively withdrawn one-third of the bars and terraces from mineral entry. The proposed Wild River designation for this segment of the Salmon River would severely restrict mineral development.

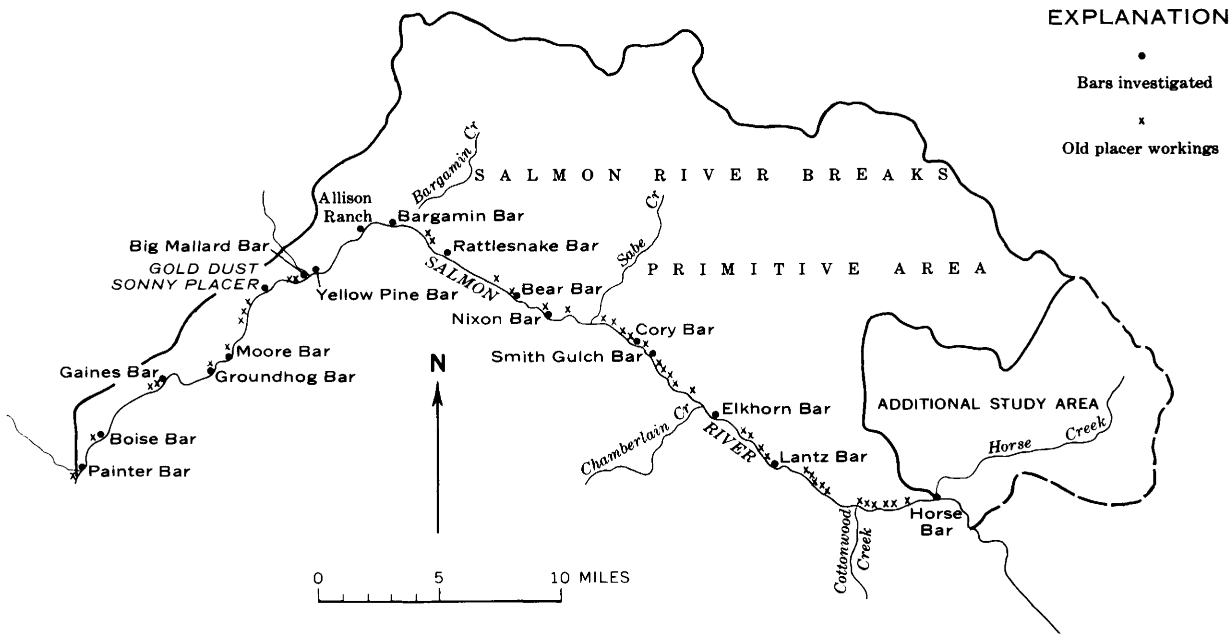


FIGURE 15.—Index map of gravel bars and placer workings along the Salmon River in the study area.

TABLE 2.—*Placer deposits in the study area*

[USFS ownership represents those lands administratively withdrawn by the U.S. Forest Service from mineral entry]

Name of bar	Ownership	Extent of bar (acres)	Range of gold values (cents/cubic yard)
Horse (Horse Cr. Nos. 1, 2, 3, 4).	Chaffin and others	6	0–<1
Lantz	USFS	20	0– 10
Elkhorn	do	4.5	0–<1
Smith Gulch	Smith et al	3	0– 2
Cory	USFS	22	<1– 12
Nixon	Gwartney and others	6	<1– 5
Bear	do	16	0–<1
Rattlesnake	Santos	11	0– 1
Bargamin	USFS	4	0–<1
Allison Ranch	Hansberger	12	0– 3
Yellow Pine	Brown	44	<1
Big Mallard	USFS	18	0– 16
Gold Dust Sonny	Washebaugh	16.5	<1
Moore	Wenzel	42	0–<1
Groundhog	USFS	22	[1] <1– 39
Gaines	Santos and Wolf	42	0– 1
Boise	Wenzel	9	[1] 0– 43
Painter	Hansberger	30	[1] 0– 33

[1] Higher figure is a single select reconnaissance pan sample that represents a small yardage of gravel.

PLACER MINING

Poor accessibility has limited development of the Salmon River placer deposits. Only two roads reach the area and both approach the river from the north via Elk City; consequently, all the miner's tools and supplies had to be packed, flown, or boated to his claim. As a result, miners were restricted to hand methods of mining. Under these conditions mining was extremely selective and only the richer and more easily accessible gravels were worked. This type of placer mining is often referred to as sniping. Evidence of old workings from sniping can be observed along the shores of the Salmon River (fig. 15). The larger gravel and boulders were piled perpendicular to the stream channel and the underlying fines were processed.

Concentrations of gold were found in sediments along the inside bend of the river behind and downriver from rock barriers such as large boulders or projecting outcrops below the high-water mark. Best values were found where a reddish clay, referred to by the miners as false bedrock, was encountered a few inches below the surface. These deposits have been referred to as flood gold deposits or skim bars. Representative of this type of deposit was a ⅔-cubic-foot sample taken from a typical pocket of gravel behind a boulder at the head of Salmon Falls, which contained $2.70 of gold per cubic yard. It is estimated that the pocket contains no more than 10 cubic yards of auriferous gravel. A total of

25,000 to 50,000 cubic yards of skim bar deposits is widely scattered along the 52 miles of the north bank of the river.

The last active period of mining was during the 1930's. The operations were typically small, employing up to four men. The operators tried to maintain an average of $3 to $6 value in gold per cubic yard but at times would mine material as low as 35 cents per yard if the gravels were easily accessible and no "deadwork" was involved. A few individual pockets or pay streaks yielded as much as several hundred dollars. Typical processing of the gravels was by rocker or sluice box.

Evaluation of the placers included taking small reconnaissance samples, test pitting, and trenching. Reconnaissance samples were concentrated by panning; larger samples from test pits and trenches were concentrated by using a vibrating mechanical sluice box. Test pits and trenches ranged in depth from 3 to nearly 36 feet, the average being 6 to 10 feet. Some were dug by backhoe; others, by hand. Ninety-two test pits were excavated and 191 samples were taken. Pits dug by the backhoe were sampled by filling the backhoe bucket at predetermined depth intervals, whereas trenches dug by hand were sampled by channel samples after the excavation was completed. For uniformity, 1 cubic foot of sample per foot of pit depth was taken from each sample excavation. The samples were then washed in the vibrating sluice box and then further concentrated by panning or processing on a Wilfley table. Petrographic examination determined the constituent minerals of the concentrates.

Pan samples were also taken from major tributaries to the Salmon River within the primitive area. The only samples containing a trace or more of gold were from Bargamin, Boise, Myers, Rhett, and Slide Creeks. A sample from Myers Creek yielded 6 cents per cubic yard. The samples from other tributaries contained a cent or less per cubic yard.

GRAVEL BARS AND TERRACES

Gravel deposits are not continuous along the Salmon River within the study area but are most numerous as alluvial terraces above the river bed and as river-level gravel bars at the mouths of tributaries. The formation of alluvial fans at the mouths of the sidestreams pushes the river into an arc which reduces water velocity along the inside bend of the river, creating conditions favorable for deposition of heavy minerals.

The largest 18 bars and terraces within the study area range in size from 3 to 44 acres and contain from 0.2 to 2.0 million cubic yards. They were sampled by test pitting and trenching (fig. 15).

The surfaces of the highest benches are 80 to 100 feet above the river, of the medium benches 40 to 50 feet above the river, and of the low benches 0 to 20 feet. The sediments are typically well sorted, and range in size from sand to boulders as much as 10 feet in diameter. Particle size varies according to location on the bench. The gravels are composed predominantly of material derived from metamorphic and granitic rocks. Granitic material is prevalent in the gravels near the intrusive masses but is only a minor constituent a few miles distant. The bars that are richer in heavy minerals are formed on metamorphic rocks. The exposed metamorphic bedrock surface is uneven and blocky, creating favorable traps for heavy minerals. Granitic bedrock along the river weathers to a smooth surface interrupted by a widely spaced joint pattern which forms a less favorable surface for the entrapment of heavy minerals.

GOLD DISTRIBUTION

All bars investigated contain at least a minor amount of gold. Values in the samples range from 0 to $2.70 per yard. Distribution of values is not uniform horizontally or vertically in any bar or terrace, and an attempt to find a pattern would require additional extensive testing. Samples taken on bedrock did not show a higher concentration of gold or other heavy minerals as might be expected. Because of the limited amount of sampling on bedrock, the presence of enriched bedrock pay streaks should not be ruled out.

In summary, samples (table 2) collected from the main body of the bars and terraces contain from 0 to 16 cents gold per cubic yard; select samples collected from small pockets of gravel contained up to $2.70 gold per cubic yard. Our studies indicate that large-scale placer mining is probably not feasible along that part of the Salmon River contiguous to the primitive area. Small-scale operations might be attempted during periods of economic depression, as was done during the 1930's.

MINERALOGY OF THE BLACK SANDS

The black sand concentrates are composed of 1 to 50 percent magnetite, 1 to 56 percent ilmenite, 1 to 30 percent garnet, trace to 10 percent zircon, 3 to 60 percent quartz and feldspar, 3 to 50 percent ferromagnesian silicates, trace rutile, 0 to 1 percent monazite, trace to 7 percent sphene, 0 to 4 percent apatite, 0 to 1 percent biotite, and trace gold. The black sand content varies from less than 1 pound to 158 pounds per cubic yard. Analysis of 189 samples showed that 158 contained less than 5 pounds per cubic yard, 16 samples contained between 5 and 10 pounds per cubic yard, and 15 samples contained more than 10 pounds per cubic yard.

Gaines bar contains an unusually large quantity of black sands. Samples from the bar averaged 34.5 pounds black sand per cubic yard of gravel whereas samples from other bars averaged 4.7 pounds per cubic yard. Gaines bar is estimated to contain 1.4 million cubic yards of gravel, but owing to its remote location, its black sands cannot now be economically mined and probably should not be considered to be a potential resource.

DESCRIPTION OF PLACER DEPOSITS

HORSE CREEK PLACERS NOS. 1, 2, 3, 4, AND HORSE BAR

These placers extend from the confluence of Horse Creek with the Salmon River to 4 miles up Horse Creek (fig. 12). The mouth of Horse Creek is 3.8 miles downriver from the end of the road at Corn Creek.

These claims were located by Wade E. Chaffin and others of Salmon, Idaho, during 1961.

Horse Creek has formed at its mouth a 6-acre gravel bar which is 10 to 15 feet above the Salmon River. This is the only appreciable amount of gravel along the 4-mile stretch of Horse Creek under mining claim location. Horse Creek's confinement within a narrow valley, steep gradient (155 feet per mile), and absence of meanders all discourage stream deposition.

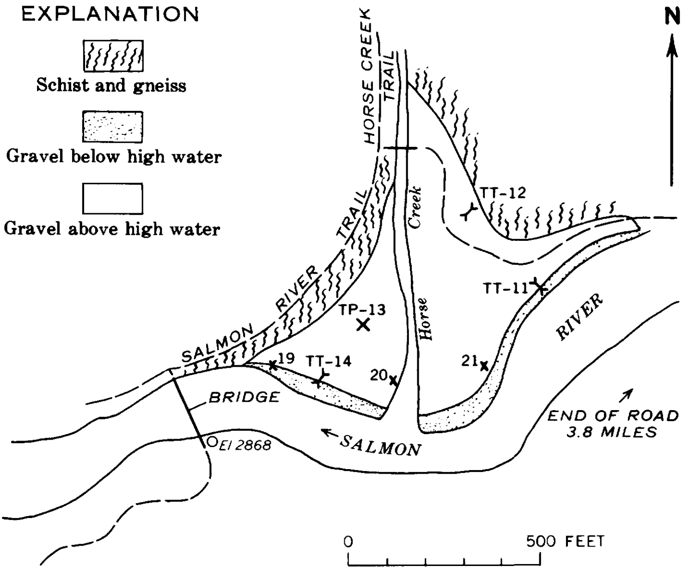
Two test pits (fig. 12, TP–1 and TP–2) were dug and sampled at the upper end of the claims, near the confluence of Colt Creek with Horse Creek, and 1 test pit and 3 test trenches dug on the bar at the mouth of Horse Creek. In addition, 15 reconnaissance samples were panned from Horse Creek within the claim boundaries, wherever small isolated pockets of gravel accumulated (figs. 12, 16).

Samples from the pits and the reconnaissance samples contained only traces of gold and averaged 1.8 pounds of recoverable black sands per cubic yard of gravel.

LANTZ BAR

These lands have been withdrawn administratively from mineral entry by the U.S. Forest Service and are used as a site for guard station and other buildings.

Lantz bar, a low alluvial terrace 0 to 15 feet above the river, covers about 20 acres (fig. 17). Little Squaw Creek flows across



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0– 3	3	<1	5.0
2	0– 3	3	0	.5
	3– 7	4	0	.5
	7–11	4	0	.7
13	0– 5	5	0	1.2
	5– 6	1	0	2.5
TT-11	0– 4	4	0	.6
	4– 8	4	<1	.7
12	0– 6	6	0	2.6
14	0– 5	5	<1	1.1
	5– 8	3	<1	1.5

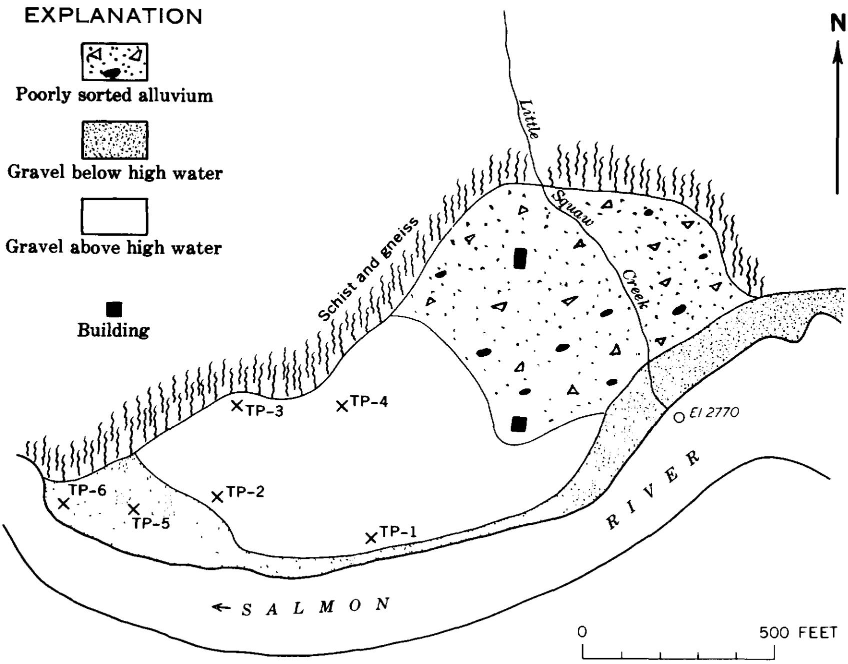
FIGURE 16.—Map of Horse Creek bar showing location of test pits (TP–13), test trenches (TT–11), and reconnaissance sample localities (19).

the upriver end and has deposited alluvium to a depth of 20 feet over one-third of the terrace.

Six test pits were dug on the bar, none of which reached bedrock. One sample from a pit contained 10 cents gold per cubic yard; the other 12 samples, 5 cents or less per cubic yard. Recoverable black sands average 4.5 pounds per cubic yard.

ELKHORN BAR

The U.S. Forest Service has administratively withdrawn Elkhorn bar from mineral entry.



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0–4	4	<1	4.4
	4–7	3	<1	3.4
2	0–3	3	1	13.4
	3–7	4	1	3.2
	7–9	2	1	5.5
3	0–4	4	0	2.2
	4–7	3	<1	2.7
4	0–4	4	0	1.3
	4–7	3	0	3.8
5	0–4	4	1	3.3
	4–6	2	<1	4.0
6	0–4	4	10	5.3
	4–6	2	5	9.9

FIGURE 17.—Map of Lantz bar showing location of test pits (TP–6).

The upper half of the bar, a low terrace 2 to 3 feet above the river (fig. 18), contains about 2 acres. The downriver half is a flat, alluvial terrace, 2 acres in size, 25 to 30 feet above the river. An old test pit 12 feet long, 4 feet wide, and 6 feet deep was observed near the center of the bar. Two test pits and three trenches were dug on this bar; none reached bedrock. Ten samples from the pits contained less than 1 cent gold per cubic yard and averaged 1.4 pounds of recoverable black sands per cubic yard of gravel.

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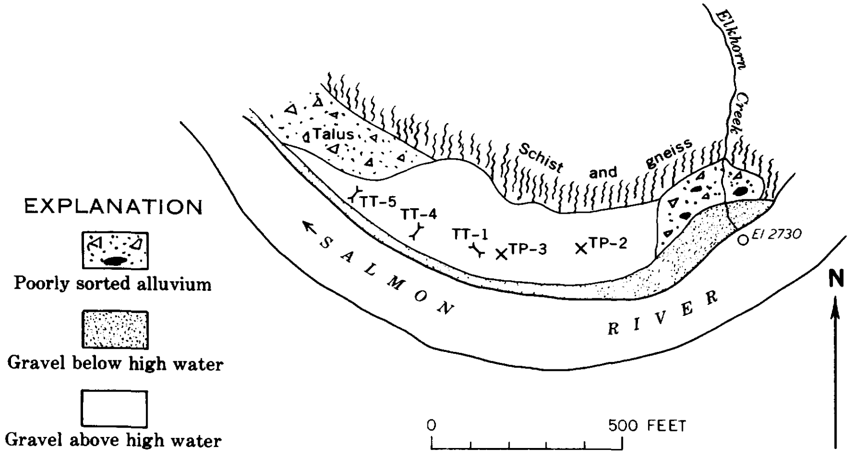


Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TT-1	0 - 6	6	0	0.7
	6 -12.5	6.5	<1	.8
	12.5-19	6.5	<1	.6
4	0 - 4.7	4.7	0	1.4
	4.7-10.2	5.5	<1	1.5
	10.2-16.9	6.7	0	.8
5	0 - 7.5	7.5	0	.5
	7.5-13	5.5	<1	.7
TP-2	0 - 4	4	<1	2.9
3	0 - 3	3	<1	7.7

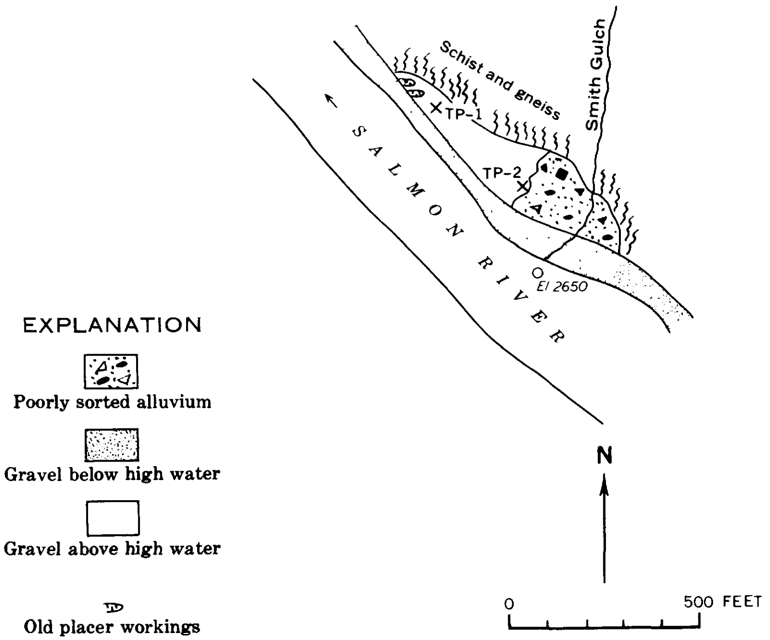
FIGURE 18.—Map of Elkhorn bar showing location of test trenches (TT–5) and test pits (TP–3).

SMITH GULCH BAR

Smith Gulch bar is a low alluvial terrace on the downriver side of Smith Gulch (fig. 19), which is claimed by Don Smith et al. of North Fork, Idaho. The surface covers about 3 acres and is 5 to 15 feet above the river. Fir and pine up to 3 feet in diameter are scattered around the periphery of the bar and thick brush grows along Smith Gulch.

The bar, immediately next to Smith Gulch, is composed of alluvium from the gulch in which irregular boulders up to 8 feet in diameter are common. River alluvium exposed on the downriver end of the bar consists of 2 to 6 feet of silty sand above boulder gravel.

Neither of two test pits dug reached bedrock, and samples from them range in value from 0 to 2 cents gold per cubic yard. One sample contained 23.4 pounds of recoverable black sands per



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP–1	0–3	3	1	23.4
	3–6	3	2	4.1
	6–9	3	0	3.1
2	0–2	2	<1	1.1
	2–5	3	0	1.2

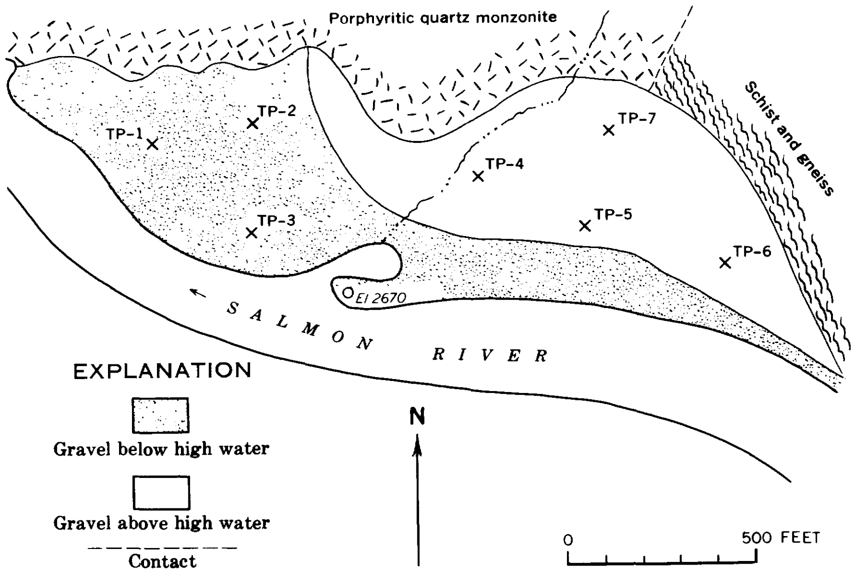
FIGURE 19.—Map of Smith Gulch bar showing location of test pits (TP–2).

cubic yard of gravel but the other four samples contained no more than 4.1 pounds per cubic yard. The bar is estimated to contain 0.04 million cubic yards of gravel.

CORY BAR

The U.S. Forest Service has administratively withdrawn Cory bar from mineral entry and permits the land to be used for recreation purposes. The bar can be divided into two parts: the downriver part below the high water mark, a flat that contains 12 acres (fig. 20), and the upriver part of 10 acres that slopes 6° to 8° upward and away from the river.

Seven test pits were dug; none reached bedrock. Samples from the pits contained <1 to 12 cents gold per cubic yard and averaged 5.6 pounds of recoverable black sands per cubic yard.



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0–4	4	2	11.1
	4–6	2	<1	9.0
2	0–4	4	12	11.3
	4–6.5	2.5	<1	11.4
3	0–4	4	1	5.9
	4–6	2	<1	2.2
4	0–4	4	<1	5.2
	4–6	2	<1	5.8
5	0–4	4	<1	2.2
	4–6	2	<1	2.0
6	0–4	4	<1	1.2
	4–6	2	<1	5.8
7	0–3	3	<1	1.6
	3–6	3	<1	1.3

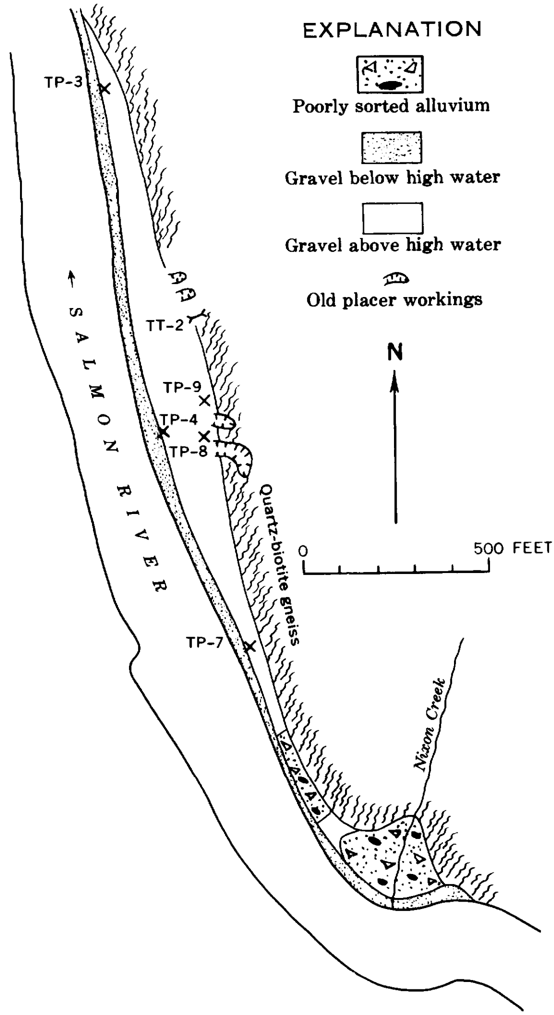
FIGURE 20.—Map of Cory bar showing location of test pits (TP–7).

NIXON BAR

The Nixon bar placer is at the mouth of Nixon Creek. It is held as the Brown Bear placer mining claim by L. M. Gwartney and others, Salmon, Idaho. The claim has been surveyed (Mineral Survey 3515) but has not been patented.

The bar is a long, narrow alluvial terrace on a slightly curved stretch of the river (fig. 21). The surface is about 15 feet above

FIGURE 21.—Map of Nixon bar showing location of test trench (TT–2) and test pits (TP–3). (See facing page.)



Sample data for Nixon bar

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/cu yd)	Black sands (lb/cu yd)
TT-2	0 - 4	1	3	1.1
	4 - 8	1	<1	1.0
	8 -11	.75	1	1.0
	11 -14.5	.875	3	.8
	14.5-19	1.12	5	.8
	19 -22	.75	4	1.5
	22 -27	1.25	4	1.5
TP-3	0 - 3	.75	<1	4.4
	3 - 4.5	.375	2	4.2
4	0 - 4.75	1.19	2	4.9
7	0 - 3	.75	<1	1.3
	3 - 6	.75	<1	1.7
8	0 - 3	.75	<1	2.9
	3 - 6.5	.875	1	.7
9	0 - 3	.75	2	2.0
	3 - 6.5	.875	2	4.0

the river and covers about 6 acres. Vegetation consists of scattered Ponderosa pine and brush. The bar narrows at the upriver end and is covered by boulders, talus, and unsorted alluvium from Nixon Creek. Boulder gravel is the major constituent of the bar below the direct influence of Nixon Creek, but a silty sand occurs along the toe of the canyon slope. Some mining was done by Mr. Monroe Hancock, the original locator, who reportedly mined $800 in gold from this location, by washing the gravel through a rocker. Workings consist of four cuts on the toe of the canyon wall that average 40 feet in width, 50 feet in length, and 7 feet in depth. These workings are in 6 to 8 feet of gravel with well-rounded boulders up to 1 foot in diameter. The bedrock is quartz-biotite gneiss. The workings do not extend down to the main terrace surface.

Five test pits and one trench were dug on the property. The trench reached bedrock. Gold values in samples taken here range from <1 to 5 cents per cubic yard. Recoverable black sands average 1.7 pounds per cubic yard of gravel.

BEAR BAR

The Malesie placer claim encompasses Bear bar and is held by M. L. Gwartney and others of Salmon, Idaho. The claim has been surveyed and is identified as Mineral Survey 3516; it has not been patented.

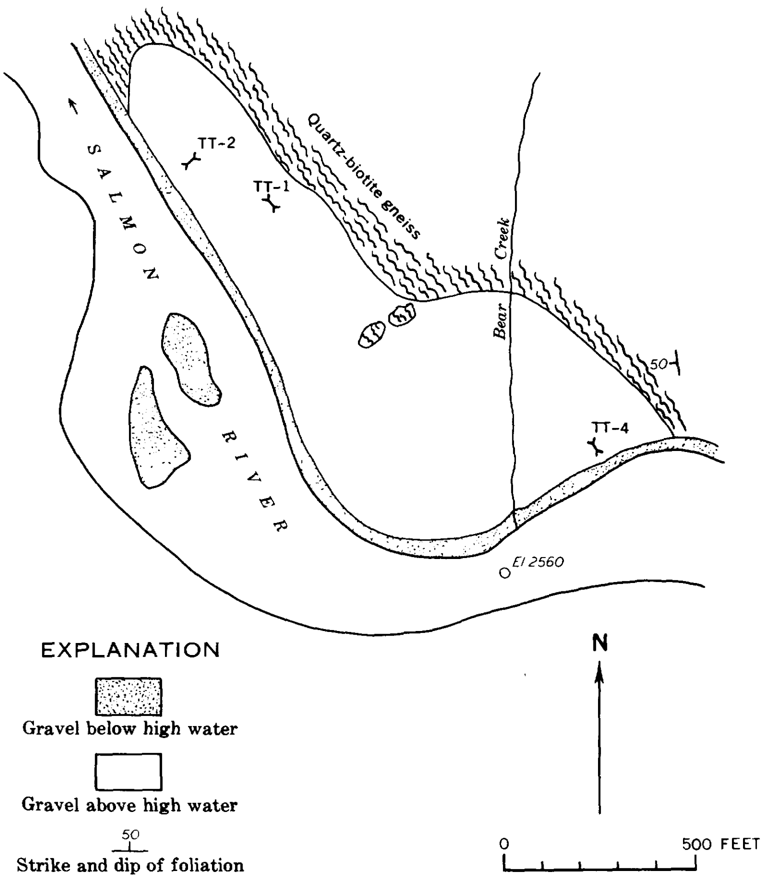
This bar is a high alluvial terrace ranging from 25 to 100 feet above the river and contains about 16 acres (fig. 22). Near Bear Creek the bar contains large angular boulders that came down Bear Creek. Beyond the influence of Bear Creek the bar is composed of pebble sand and sandy gravel. Boulders larger than 1 foot in diameter were found in test pit 1. Quartz-biotite gneiss bedrock is exposed near the center of the bar.

Old workings were noted on the downriver end of the bar in the bank facing the river; however, no records of production are available.

Three trenches were dug on this bar. Samples contained less than 1 cent gold per cubic yard and averaged 1.3 pounds of recoverable black sands per cubic yard of gravel.

RATTLESNAKE BAR

The Rattlesnake bar is encompassed by the Rattlesnake placer claim located August 10, 1961, by Frank and Bessie Santos of Redding, Calif. The only working is a discovery pit 10 feet in di-

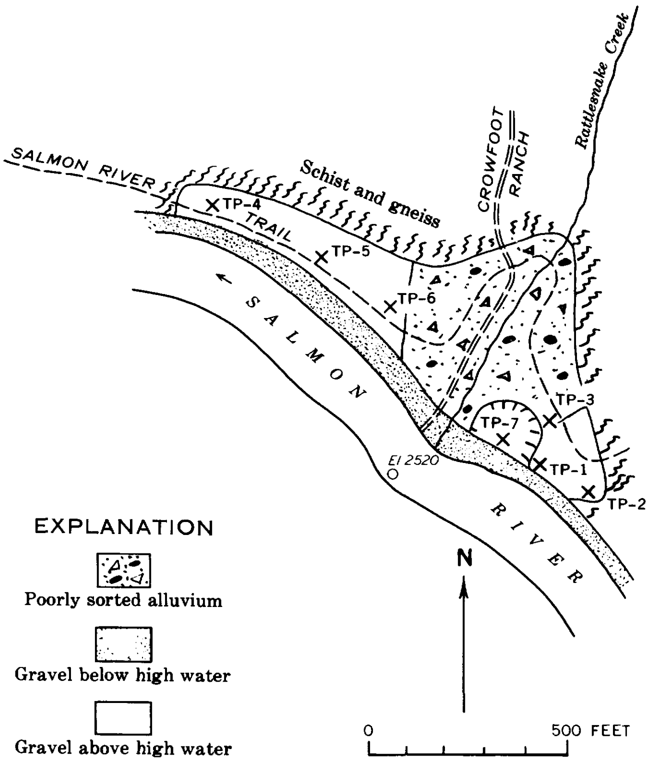


Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TT-1	0 – 4	4	<1	1.5
	4 –12	8	<1	.8
	12 –15	3	<1	1.2
	15 –20	5	0	.8
	20 –24.7	4.7	<1	1.9
2	0 – 2	2	<1	2.5
	2 –10	8	<1	.5
	10 –15.5	5.5	<1	.7
	15.5–18.2	2.7	0	1.6
	18.2–22.2	4.0	<1	1.6
	22.2–27.9	5.7	<1	.7
	27.9–33.5	5.6	0	.9
4	0 – 5.5	5.5	0	.6
	5.5–11.9	6.4	0	.5
	11.9–17.9	6.0	0	.5
	17.9–22.3	4.4	0	2.0
	22.3–26.6	4.3	0	.9

FIGURE 22.—Map of Bear bar showing location of test trenches (TT–4).

ameter and 5 feet deep (fig. 23). The bar contains 11 acres and lies 50 feet above the river. The central part, adjacent to Rattlesnake Creek, is covered by alluvium from the creek. Well-rounded river gravel and sand is exposed on the upriver and downriver parts of the bar.



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0-3	3	0	1.4
	3-6	3	0	1.0
2	0-3	3	<1	.8
	3-6	3	<1	.9
3	0-3	3	0	2.0
	3-6	3	0	1.6
4	0-3	3	1	6.8
	3-7	4	<1	6.0
5	0-3	3	<1	2.4
	3-7	4	<1	1.6
6	0-3	3	<1	1.3
	3-5	2	<1	2.4
7	0-5	1.4	0	2.5

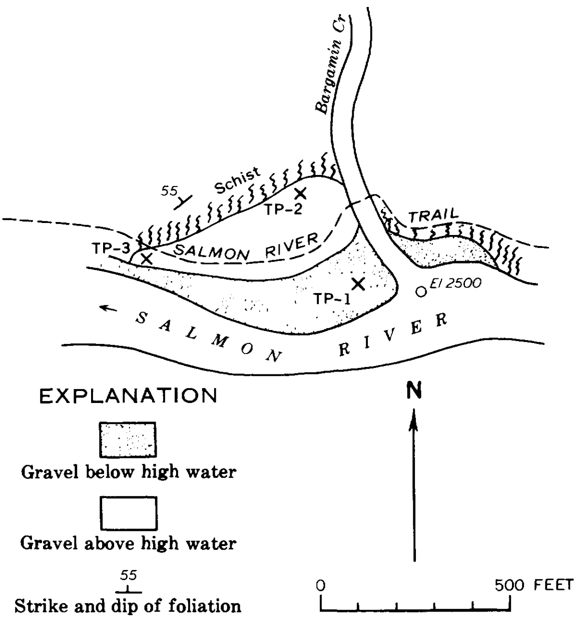
FIGURE 23.—Map of Rattlesnake bar showing location of test pits (TP-7).

Seven test pits were dug in the bar and none reached bedrock. One sample contained 1 cent gold per cubic yard and the other 12 samples 0 to <1 cent. Recoverable black sands averaged 2.5 pounds per cubic yard of gravel.

BARGAMIN BAR

Bargamin bar, with an area of about 4 acres, is adjacent to and on the downriver side of Bargamin Creek. No active mining claims cover the bar. These lands are administratively withdrawn from mineral entry by the U.S. Forest Service for public recreational use.

Three test pits were dug on the bar; none reached bedrock. Samples (fig. 24) from the pits contained 0 to <1 cent gold per cubic yard and averaged 2.5 pounds of black sands per cubic yard of gravel.



Sample data

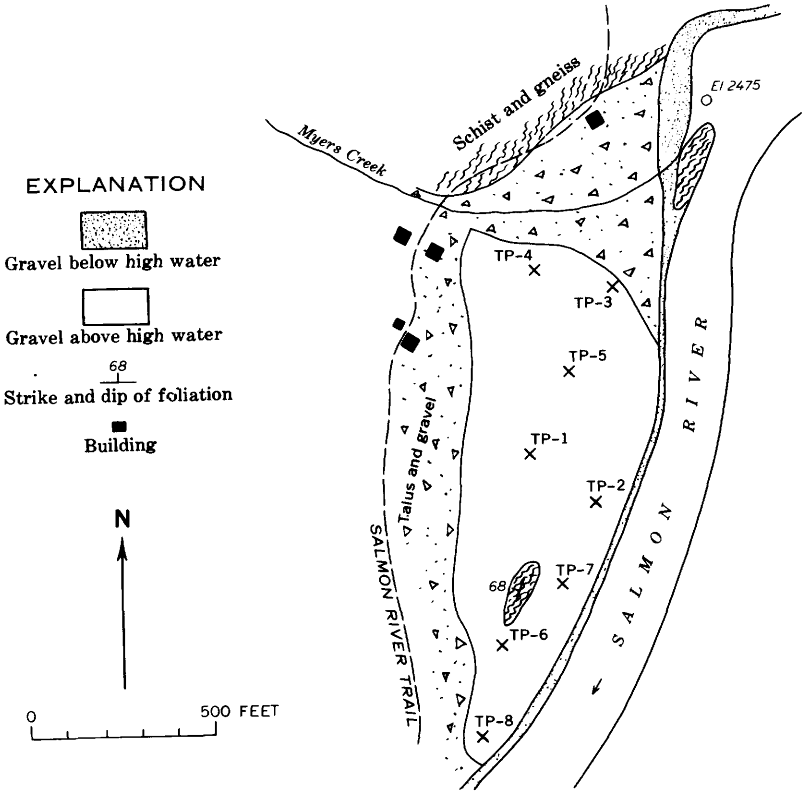
Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TP-1	0–3	3	<1	1.1
	3–6	3	0	2.9
2	0–3	3	0	3.6
	3–6	3	0	2.0
3	0–3	3	0	2.3
	3–5	2	0	3.5

FIGURE 24.—Map of Bargamin bar showing location of test pits (TP–3).

ALLISON RANCH

The Allison Ranch is a patented homestead (Homestead Entry 169) owned by Robert V. Hansberger of Boise, Idaho.

Part of the ranch is on a flat alluvial terrace of approximately 12 acres that is 30 feet above the river (fig. 25), and is occupied



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0–3	3	0	2.1
	3–6	3	0	2.0
2	0–3	3	<1	1.9
	3–6	3	<1	1.3
3	0–4	4	<1	2.1
4	0–3	3	<1	2.3
5	0–2	2	<1	2.2
6	0–3	3	<1	2.6
	3–7	4	<1	2.1
7	0–3	3	3	3.9
	3–7	4	<1	2.5
8	0–3	3	<1	4.5
	3–6	3	<1	3.1

FIGURE 25.—Map of Allison Ranch area showing location of test pits (TP–7).

by an irrigated hayfield. An airstrip, two houses, barn and other improvements are located a short distance north and east of the terrace. As shown by tests pits 1, 3, 4, and 5, the upriver half of the terrace is composed largely of granitic boulders and decomposed granite, probably alluvium from Myers Creek. The lower half consists of sand and sandy gravel, sediments from the Salmon River.

Eight test pits were dug on the bar. Samples from the pits contained up to 3 cents gold per cubic yard and averaged 2.5 pounds of black sands per cubic yard of gravel.

YELLOW PINE BAR

Yellow Pine bar is a patented homestead (Homestead Entry 729), owned by Warren Brown, McCall, Idaho. It is a flat alluvial terrace 50 feet above the river and contains approximately 44 acres (fig. 26). Although most of the bar has been cleared of trees, large pines as much as 3 feet in diameter remain on the upriver end and are scattered along the periphery. Large angular boulders of quartz-biotite gneiss, up to 10 feet across, are exposed over the bar. River-washed gravels are exposed only on the lower end of the bar.

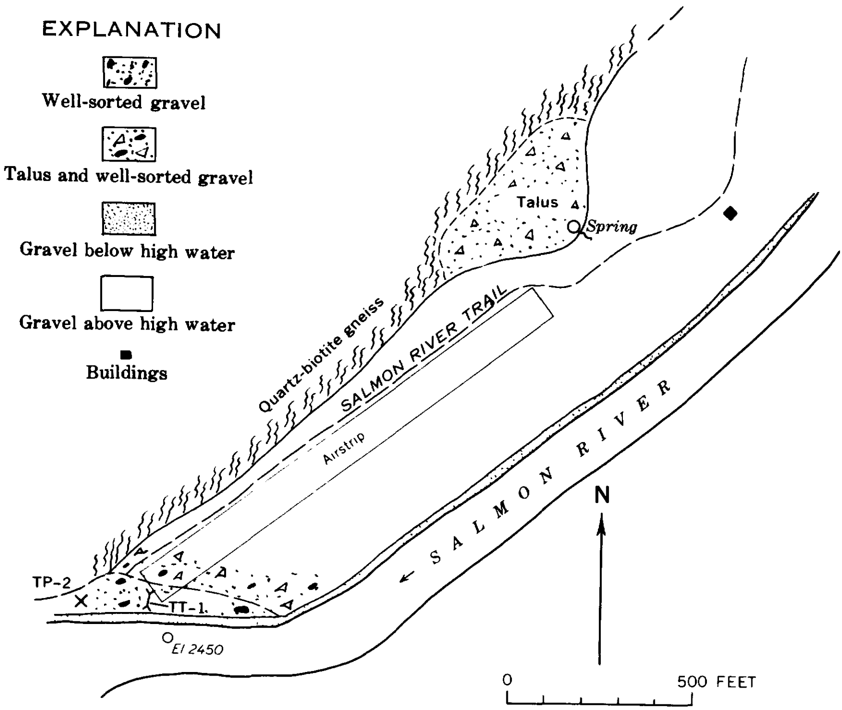
One test trench and a pit which bottomed on bedrock were dug on the lower end where the river gravels are exposed. Samples contained only a trace of gold and averaged 0.6 pound of black sands per cubic yard of gravel.

BIG MALLARD BAR

There are no mining claims on Big Mallard bar. The lands have been administratively withdrawn from mineral entry by the U.S. Forest Service and are used for recreation purposes.

Four alluvial terraces 5 to 60 feet above the river make up the bar, which occupies approximately 18 acres. The three lower terraces are flat-topped and nearly horizontal but the fourth slopes upward away from the river at 11°. The terraces are separated, in part, by bedrock outcrops which indicate that the alluvial cover is thin.

Several small, old prospect pits are on the low terrace next to the river. Nine test pits were dug on the bar with a backhoe; two of them reached bedrock. Samples from the pits contained a range of values from 0 to 16 cents gold per cubic yard, and averaged 5.2 pounds of black sands per cubic yard (fig. 27).



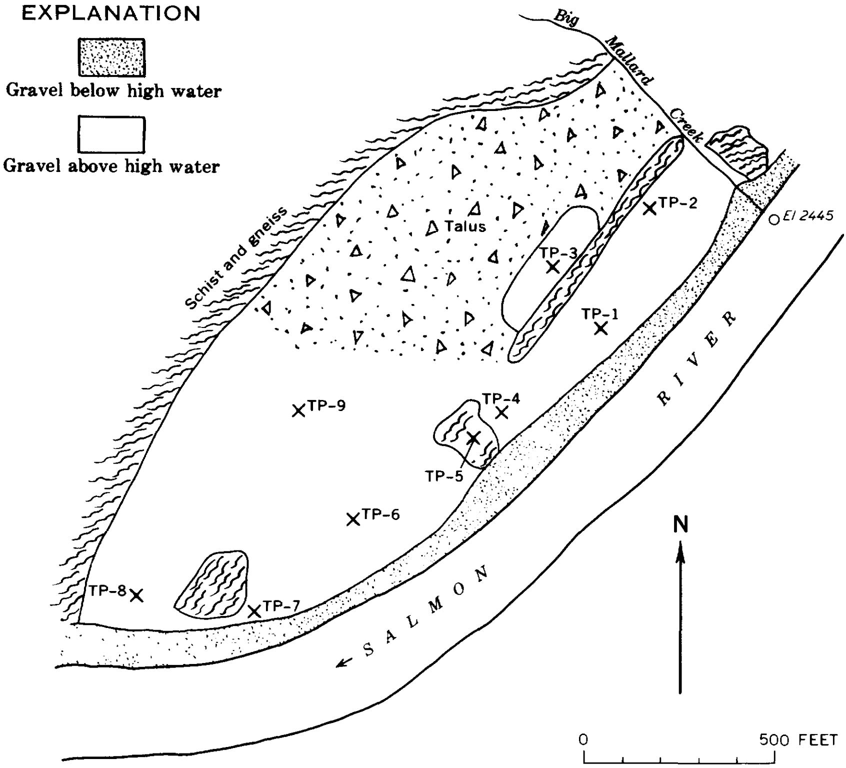
Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TT-1	0 -10.3	10.3	<1	0.8
	10.3-13.0	2.7	<1	1.1
	13.0-26.7	13.7	<1	.2
	26.7-35.7	9.0	<1	.8
TP-2	0 - 3	1	<1	2.5

FIGURE 26.—Map of Yellow Pine bar showing location of test trench (TT-1) and test pit (TP-2).

GOLD DUST SONNY PLACER

The Gold Dust Sonny placer claim is a bouldery gravel strip approximately 300 by 2,400 feet on a moderately steep slope between the White Water Ranch (Homestead Entry 726) and the Salmon River (fig. 28). The claim was located in 1957 by Mr. Harry Washebaugh, Puma, Ariz., and may be reached by the Elk City–White Water Ranch road.

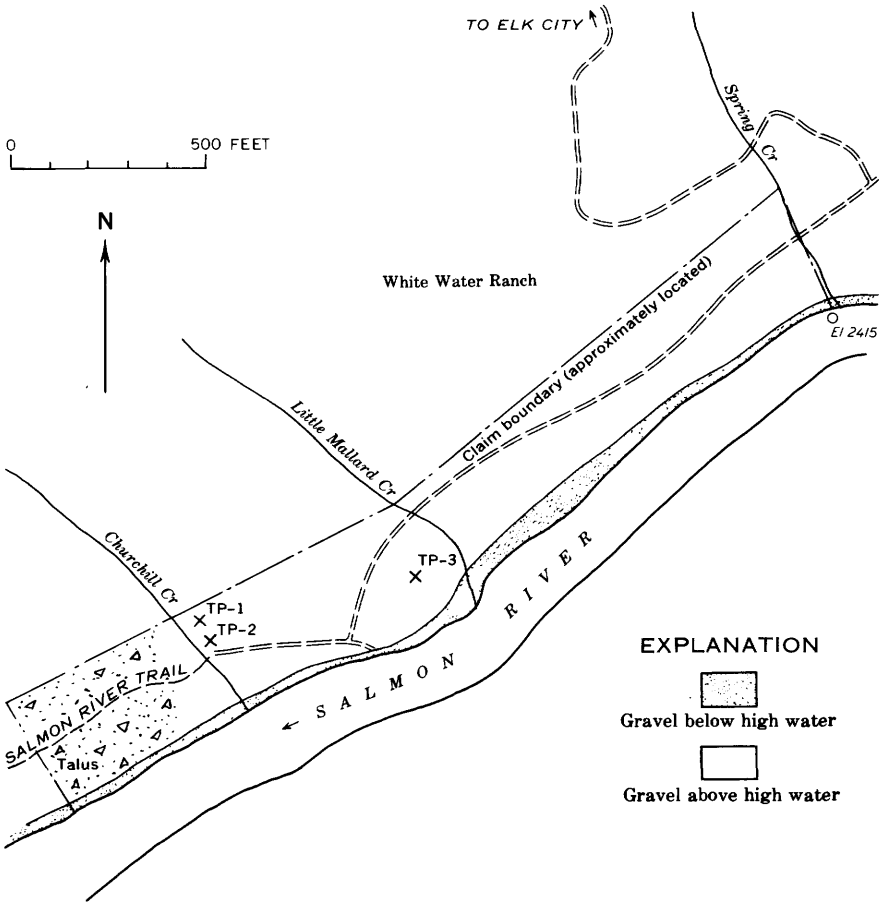


Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0–3	3	<1	14.8
	3–7	4	<1	2.3
2	0–3	3	<1	7.5
	3–7	4	<1	3.2
3	0–3	3	<1	4.4
	3–6	3	<1	3.2
4	0–3	3	<1	24.6
	3–4	1	16	25.3
5	0–4	4	4	5.5
6	0–3	3	<1	1.5
	3–6	3	<1	.8
7	0–3	3	<1	.8
	3–6	3	0	.4
8	0–3	3	4	2.6
	3–5	2	7	3.7
9	0–3	3	<1	2.0
	3–7	4	1	1.2

FIGURE 27.—Map of Big Mallard bar showing location of test pits (TP–9).

Three old pits were sampled on the property. One pit is on Little Mallard Creek and two on Churchill Creek. Samples from the pits contain less than 1 cent gold per cubic yard of gravel and average 0.7 pound of black sands per cubic yard.



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TP-1	0-6	4.5	<1	0.9
2	0-9	8	<1	.5
3	0-4.5	4.5	<1	.7

FIGURE 28.—Map of the Gold Dust Sonny placer showing location of test pits (TP-3).

MOORE BAR

The Slide Creek placer claim, which covers Moore bar, is held by John G. Wenzel of Dixie, Idaho (fig. 29).

Moore bar is a flat alluvial terrace, 42 acres in size, on a sharp inside bend of the river and reaches a height of 70 feet above the river. Large irregular boulders, some as much as 10 feet in diameter, are scattered over the terrace surface. The bar is composed of bouldery gravel. Boulders are more numerous at depth.

Three trenches were dug and sampled on the lower end of the bar; one reached bedrock. Samples from the trenches contained no more than a trace of gold per cubic yard and averaged 0.5 pound of black sands per cubic yard.

GROUNDHOG BAR

There are no active mining claims on Groundhog bar, which has been withdrawn from mineral entry by the U.S. Forest Service for administrative purposes. Groundhog bar is a 22-acre flat-topped alluvial terrace that is 10 to 25 feet above the river (fig. 30). Groundhog Creek crosses the upriver end and has deposited alluvium over the upper third of the bar. The alluvium is poorly sorted and contains irregular quartzite bounders up to 10 feet in diameter.

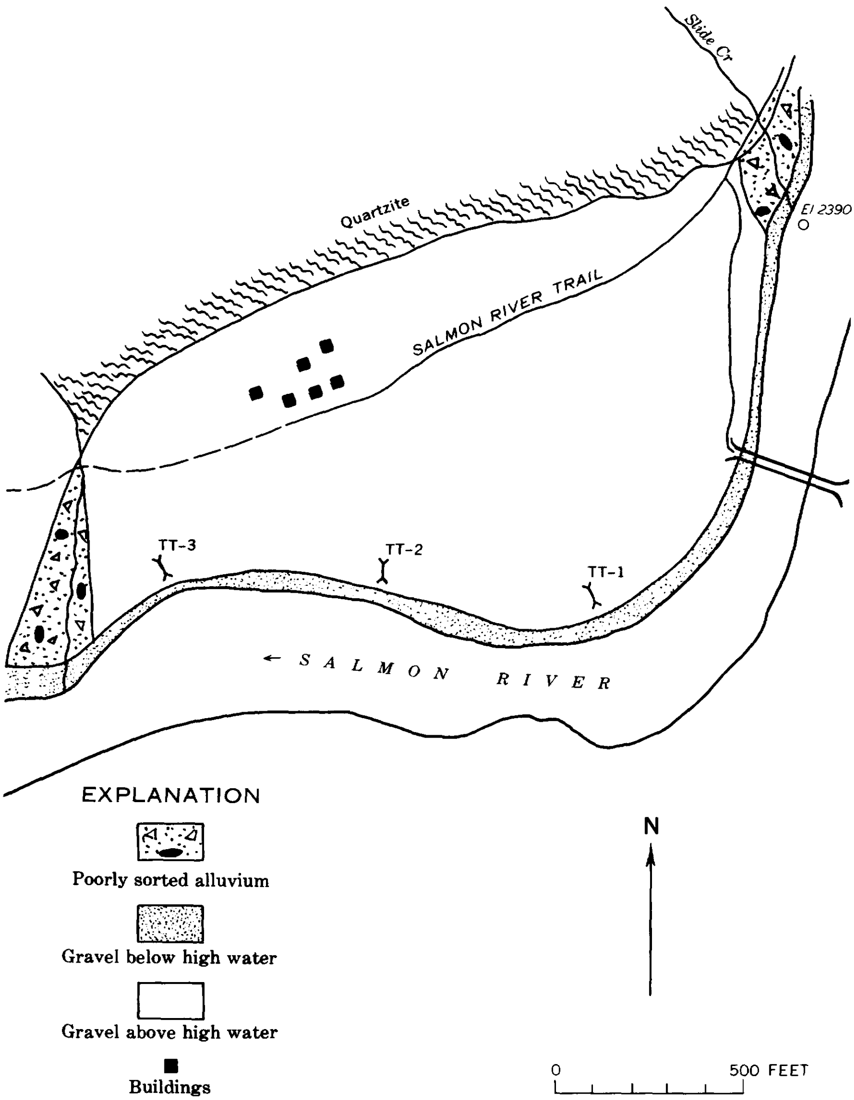
The bar has been prospected by four old shallow pits but new test pits were dug for sampling. Samples from these new pits contained from a trace to 1 cent gold per cubic yard and averaged 2.5 pounds of black sands per cubic yard of gravel.

Reconnaissance samples were panned from four sites along the bar from the channel of the Salmon River. A panned sample from one site (R–1) contained a value of 39.0 cents gold per cubic yard. The site is a protected eddy at the base of a quartzite outcrop on the extreme downriver end of the bar. There is about 50 cubic yards of the sampled material on the upriver side of the outcrop. The other three samples, R–2 to R–4, represent material containing, respectively, 2.6 cents, 0.5 cent, and a trace of gold per cubic yard.

GAINES BAR

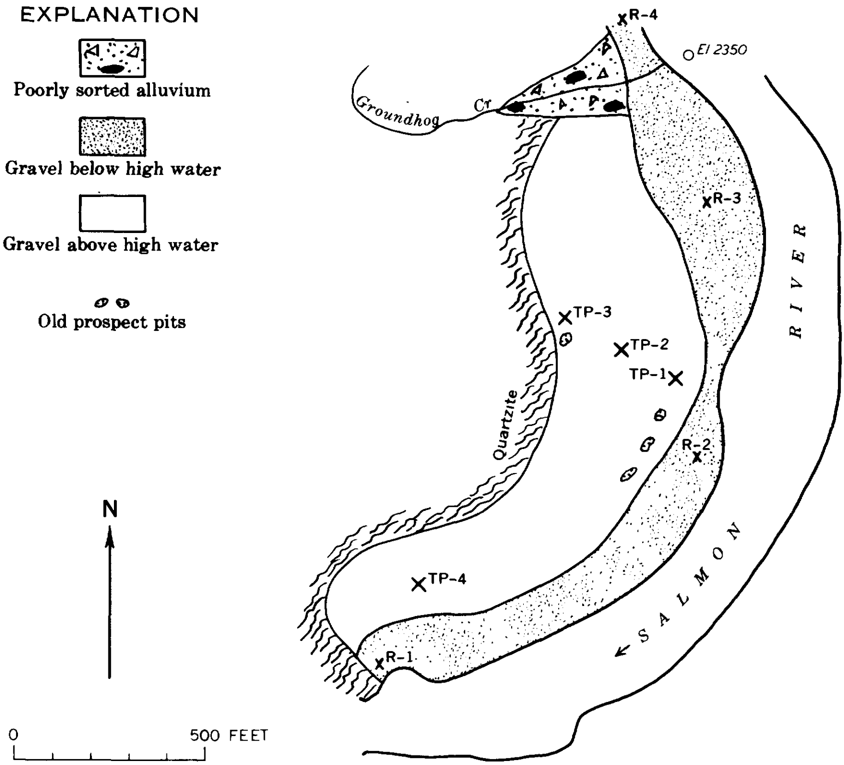
Gaines bar is a flat-topped, elongated alluvial terrace 10 to 20 feet above the river. Rhett Creek crosses the bar near its downstream end (fig. 31). Two mining claims cover the terrace. The area downriver from Rhett Creek contains 11 acres and is the Rhett Creek placer, owned by Frank Santos of Redding, Calif. The 31-acre area upriver from Rhett Creek is covered by the Billie placer, owned by Mrs. Reho Wolf of Lewiston, Idaho.

Evidence of old placer mining on the Rhett Creek placer (fig. 31) consists of washed cuts on a skim bar within the main



Sample data for Moore bar

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold content (cents/cu yd)	Black sands (lb/cu yd)
TT-1	0 - 4.2	4.2	<1	0.5
	4.2-10.0	5.8	0	.3
	10.0-14.5	4.5	<1	.3
	14.5-21.5	7.0	<1	.6
	21.5-28.5	7.0	<1	.3
2	0 -10.2	10.2	<1	.7
	10.2-21.7	11.5	<1	.5
	21.7-28.7	7.0	<1	.7
3	0 -13.0	13.0	<1	.5
	13.0-24.5	11.5	<1	.5



Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0 -5.3	5.3	<1	2.6
	5.3-9.1	3.8	<1	2.6
2	0 -6	6.0	<1	1.2
3	0 -3.8	3.8	<1	1.9
	3.8-8.6	4.8	<1	1.9
4	0 -5	.77	1	3.9

FIGURE 30.—Map of Groundhog bar showing location of test pits (TP-4) and reconnaissance sample localities (R-4).

Salmon River channel. The workings are not more than 3 feet deep and cover an area 20 feet wide and 300 feet long.

Seven test pits were dug on the bar, but none reached bedrock. Eight samples from the pits and six panned samples contained not more than 1 cent gold per cubic yard, but test-pit samples averaged 34.5 pounds of black sands per cubic yard. Because of the

FIGURE 29.—Map of Moore bar showing location of test trenches (TT-3). (See facing page.)

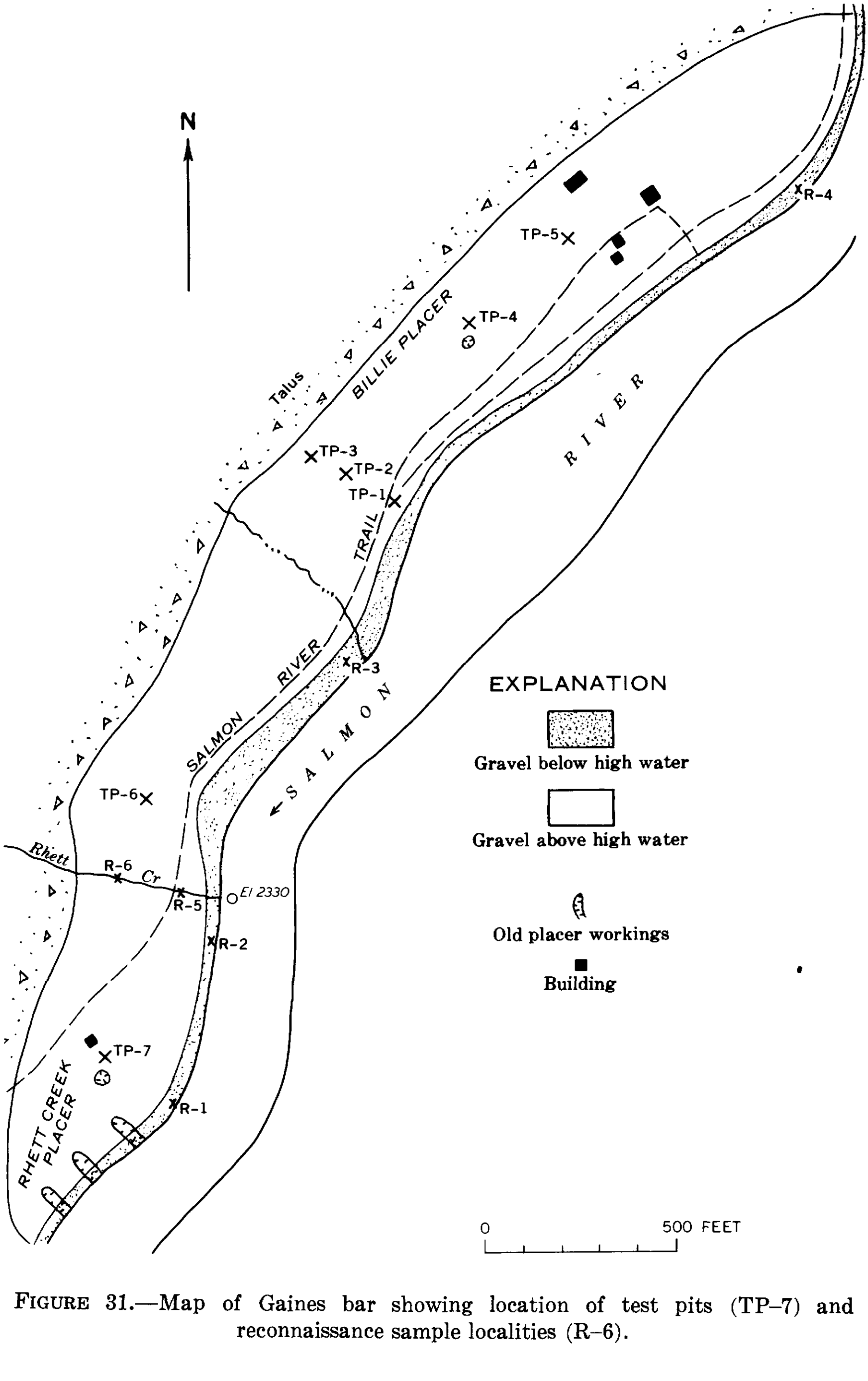


FIGURE 31.—Map of Gaines bar showing location of test pits (TP–7) and reconnaissance sample localities (R–6).

bar's low gold content and remote location, the black sands are not economically minable.

BOISE BAR

Boise bar is a relatively flat alluvial terrace of about 9 acres, that is 20 to 25 feet above the river (fig. 32). Unsorted angular alluvium from Boise Creek covers the bar near Boise Creek and bouldery river gravel comprises the remainder. Two old prospect pits, each 6 feet in diameter and 4 feet deep, were noted near the center of the bar. Test pit 1 is at the site of one of these pits. Two old placer workings are located on the lower end of the bar. Each measures 8 feet wide by 6 feet deep by approximately 220 feet long. John G. Wenzel, Dixie, Idaho, holds the bar under mining claim location.

Three test pits were dug, but none reached bedrock. Samples from the pits contain 3 cents or less gold per cubic yard and averaged 6.9 pounds of black sands per cubic yard of gravel.

Reconnaissance samples were panned from five sites—four located behind protective boulders along the bank of the Salmon River and one from the Boise Creek streambed. The amount of gravel trapped behind these boulders would not be more than 2 or 3 cubic yards. The gold values in the samples are shown on figure 32.

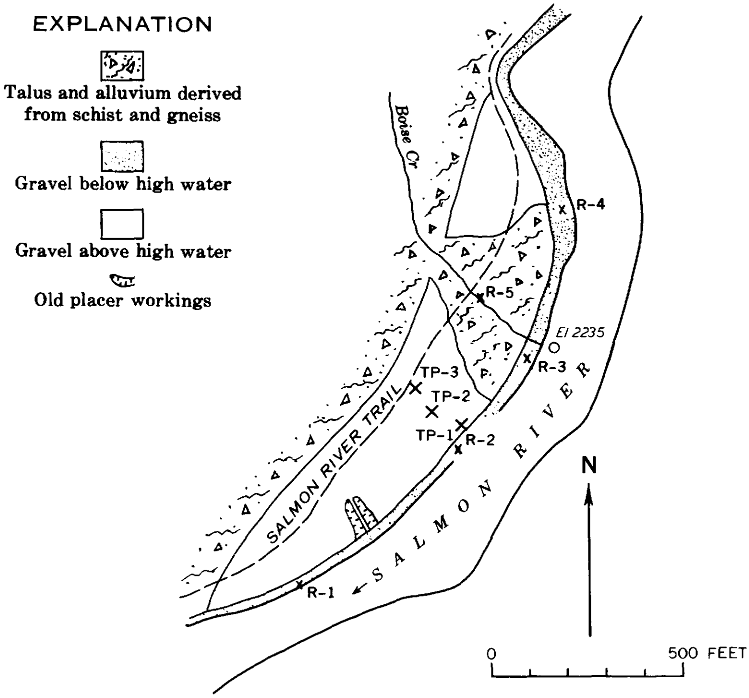
PAINTER BAR

Painter bar is a patented homestead (Homestead Entry 684) and can be reached by road from Elk City via Dixie. The Painter mine property is adjacent to the Homestead and consists of the Surprise 2 through 5 patented lode mining claims. Both properties are owned by Robert V. Hansberger, Boise, Idaho.

Painter bar is an alluvial terrace with an area of about 30 acres that is 10 to 20 feet above the river and two terrace remnants 20 feet higher (fig. 33). The terraces are relatively flat and slope gently up away from the river.

Sample data

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0 –3.5	3.5	0	6.0
	3.5–7.0	3.5	0	10.0
2	0 –5.1	5.1	0	4.5
3	0 –3	3	<1	4.5
4	0 –5	5	<1	158.0
5	0 –3	3	<1	6.1
6	0 –4.1	4.1	<1	12.8
7	0 –5.5	5.5	1	73.9



Sample data

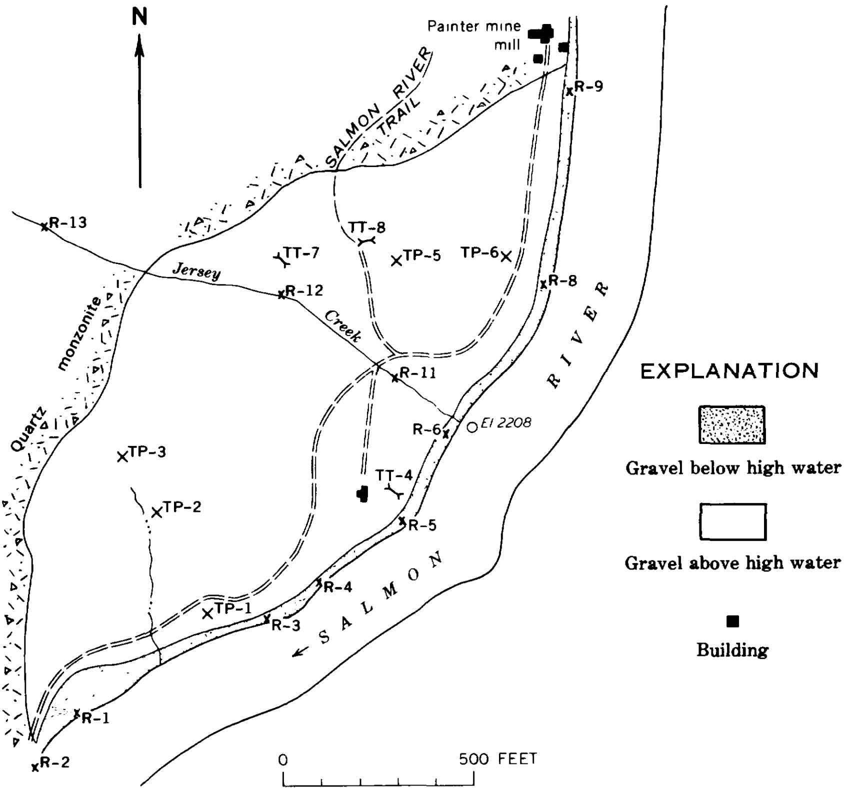
Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/ cu yd)	Black sands (lb/cu yd)
TP-1	0 -6	6	3	1.6
	6 -8	2	0	1.4
2	0 -3.5	3.5	<1	4.0
	3.5-6	2.5	0	2.2
3	0 -4	4	<1	18.8
	4 -6.5	2.5	<1	10.2

Reconnaissance sample data

Sample No.	Gold (cents/ cu yd)	Sample No.	Gold (cents/ cu yd)
R-1	13	R-4	29
2	9	5	<1
3	45		

FIGURE 32.—Map of Boise bar showing location of test pits (TP-3) and reconnaissance sample localities (R-5).

FIGURE 33.—Map of Painter bar showing location of test pits (TP-6), test trenches (TT-8), and reconnaissance sample localities (R-13). (See facing page.)



Sample data for Painter bar

Site No.	Depth interval (ft)	Sample volume (cu ft)	Gold (cents/cu yd)	Black sands (lb/cu yd)
TP-1	0 - 5	5	2	5.5
2	0 - 4.5	4.5	<1	.6
	4.5- 8.0	3.5	0	1.1
	8.0-10.8	2.8	0	1.5
3	0 - 3	3	0	.4
5	0 - 5	5	<1	1.8
	5 -10*	5	2	1.7
	8 -13*	5	1	2.0
6	0 - 5	5	<1	3.5
TT-4	0 - 5	5	<1	1.5
	5 - 9	4	<1	3.4
	9 -14	5	<1	2.8
7	0 - 5	5	2	2.8
	5 - 8	3	0	.8
8	0 - 6	6	1	1.4

* Note overlap in depth.

Reconnaissance sample data

Sample No.	Gold (cents/cu yd)	Sample No.	Gold (cents/cu yd)
R-1	<1	R-8	12
2	<1	9	15
3	33	11	0
4	6	12	0
5	<1	13	0
6	6		

Bouldery gravel and pebbly sand make up most of the bar, with the particle size increasing with depth.

The bar has been explored by three old prospect pits. Two of them are approximately 6 feet in diameter and 5 feet deep and the third is 20 feet in diameter and 13 feet deep. Samples TP–5, TP–6, and TT–7 were taken from these pits. Five additional test pits and three test trenches were dug on the property; none reached bedrock. Samples from the pits and trenches contained values up to 2 cents gold per cubic yard and an average of 2.8 pounds of black sands per cubic yard.

Reconnaissance samples were panned from 11 sites. Samples R–1 through R–9 were panned from the Salmon River channel along the face of the bar, and samples R–11 through R–13, from Jersey Creek. Sample R–3, the richest, had a value of 33 cents gold per cubic yard. The gravel composing this sample was taken from a pocket behind a 10-foot boulder next to the river. Not more than 1 or 2 yards of gravel is trapped in the pocket.

CONCLUSIONS

The total mineral resources of the Salmon River Breaks area appear small, and important discoveries in the future are unlikely. The Big Squaw Creek fluorspar deposit contains an estimated 100,000 tons of commercial-grade rock but inaccessibility makes recovery uneconomical now and in the foreseeable future. The Painter mine has been developed by extensive underground workings, but the results of the development were disappointing, owing to weak erratic veins and small amounts of gold and silver. Gold has been produced by small placer operations at numerous points along the Salmon River, predominantly during the depression years of the 1930's. Overall placer production was on the order of $50,000—mostly from low-grade ground. Evidence of placering for small high-grade pockets of auriferous gravels is scattered all along the Salmon River within the study area. It is estimated that small pockets of gold-bearing gravel, aggregating 25,000 to 50,000 cubic yards and having an average gold content of about $1 per cubic yard, remain along the 52-mile stretch of the Salmon River within the study area.

REFERENCES CITED

Anderson, A. L., 1952, Multiple emplacement of the Idaho batholith: Jour. Geology, v. 60, no. 3, p. 255–265.

DeVoto, Bernard, ed., 1953, The journals of Lewis and Clark: Boston, Mass., Houghton Mifflin Co., 504 p.

Fenneman, N. M., 1931, Physiography of western United States: New York, McGraw-Hill Book Co., Inc., 534 p.

Fyfe, W. S., Turner, F. J., and Verhoogen, John, 1958, Metamorphic reactions and metamorphic facies: Geol. Soc. America Mem. 73, 259 p.

Greenwood, W. R., and Morrison, D. A., 1967, Reconnaissance geology of the Selway-Bitterroot Wilderness Area: Idaho Bur. Mines and Geology Inf. Circ. 18, 17 p.

Larsen, E. S., Jr., Gottfried, David, Jaffe, H. W., and Waring, C. L., 1958, Lead-alpha ages of the Mesozoic batholiths of western North America: U.S. Geol. Survey Bull. 1070–B, p. 35–62.

Lindgren, Waldemar, 1904, A geological reconnaissance across the Bitterroot Range and Clearwater Mountains in Montana and Idaho: U.S. Geol. Survey Prof. Paper 27, 123 p.

McDowell, F. W., and Kulp, J. L., 1969, Potassium-argon dating of the Idaho batholith: Geol. Soc. America Bull., v. 80, no. 11, p. 2379–2382.

Montgomery, Gill, 1970, Fluorspar: Eng. and Mining Jour., v. 171, no. 3, p. 141–142.

Ross, C. P., 1930, Early Pleistocene glaciation in Idaho: U.S. Geol. Survey Prof. Paper 158–G, p. 123–128.

———1934, Geology and ore deposits of the Casto quadrangle, Idaho: U.S. Geol. Survey Bull. 854, 135 p. [1935].

Shenon, P. J., and Reed, J. C., 1936, Down Idaho's River of No Return: Natl. Geog. Mag., v. 70, no. 1, p. 94–136.

U.S. Bureau of Mines, 1970, Fluorspar, *in* Commodity data summaries: Washington, U.S. Bur. Mines, p. 52–53.

———1971, Minerals yearbook for 1969, v. 1–2, Metals, minerals, and fuels: Washington, U.S. Govt. Printing Office, 1194 p.

TABLE 1.

Samples were analyzed by six-step semiquantitative spectrographic method, except CxHM and CxCu, which were by chemical method. Analysts: E. F. Cooley, D. J. Grimes, J. R. Hassemer, R. T. Hopkins, Jr., H. King, R. L. Miller, M. S. Rickard, and A. J. Toevs. Results of spectrographic analyses are reported to the nearest number in the series 1, 0.7, 0.5, 0.2, 0.15, 0.1, and so forth, which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30 percent of the time. The sensitivity limit is shown in parentheses below the element symbol at the head of the column. N, looked for but not detected; L, detected but below limit of determination or below value shown; and G, greater than value shown in parentheses. Looked for but not detected: Au, Pt, Pd, Te, and U. Looked for but not found in significant amounts: B, Sb, and Sc. Reported as footnotes: As, Cd, and W. Areas where samples were collected are classified as follows: A, C, E—west, central, and eastern areas, respectively, tributary to Salmon River; B—Bargamin Creek drainage; D—Sabe Creek drainage; F—Selway River drainage; G—Horse Creek drainage.

TABLE 1.—*Analyses of samples from the Salmon River*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
					Active stream sediment samples								
M- 2	F	3	.2	1.5	.3	500	N	700	3	N	L	7	15
M- 3	F	7	.3	1.5	.7	700	N	700	2	N	5	5	10
M- 4	F	3	.3	1	.3	500	N	500	2	N	N	10	10
M- 5	F	3	.3	1	.5	700	N	500	2	N	N	10	10
M- 6	F	3	.2	1	.3	500	N	700	1.5	N	N	5	15
M- 7	F	3	.3	1.5	.7	700	N	500	3	N	L	10	20
M- 9	F	2	.2	1	.3	300	N	500	1.5	N	L	7	7
M- 10	F	3	.3	1	.5	500	N	300	1.5	N	7	15	7
M- 11	F	2	.3	1	.3	300	N	500	2	N	7	10	15
M- 12	F	2	.3	1	.3	300	N	500	1	N	7	10	L
M- 13	F	3	.7	1.5	.2	300	N	700	1.5	N	10	70	15
M- 14	F	3	.7	1.5	.5	300	N	500	1	N	10	70	20
M- 15	F	3	1	1.5	.5	300	N	500	1	N	10	100	10
M- 16	F	3	.5	1.5	.5	300	N	700	1	N	7	15	10
M- 17	F	2	.5	1	.2	300	N	300	1	N	7	50	15
M- 18	F	3	.5	1	.3	300	N	150	1	N	5	15	5
M- 19	F	.7	.1	.2	.03	50	N	30	L	N	N	20	5
M- 21	F	2	1	.7	.15	500	N	150	L	N	15	70	30
M- 23	F	.3	.07	.3	.03	150	N	100	1	N	N	10	5
M- 24	F	.5	.1	.3	.05	150	N	100	1	N	N	20	7
M- 25	F	.07	L	.07	.02	L	N	L	L	N	N	7	5
M- 26	F	3	.5	1	.7	300	N	200	L	N	7	15	15
M- 27	F	1.5	.3	.7	.3	300	N	200	L	N	5	20	10
M- 28	F	3	.7	1.5	.3	300	N	500	2	N	10	20	15
M- 29	F	2	.5	1.5	.2	300	N	500	1	N	7	20	15
M- 30	F	2	.3	.7	.2	200	N	300	1	N	7	5	5
M- 31	F	3	.7	1	.3	300	N	300	1	N	10	30	10
M- 32	F	2	.5	1.5	.3	300	N	500	1	N	7	15	10
M- 33	F	1.5	.5	1.5	.2	300	N	500	1	N	7	15	15
M- 34	F	3	.5	1.5	.3	300	N	500	1.5	N	10	15	15
M- 35	F	3	.7	1	.5	300	N	500	1	N	10	15	20
M- 36	F	2	.3	.7	.2	200	N	200	1	N	7	10	15
M- 37	F	2	.5	1	.2	300	N	500	1	N	7	15	7
M- 38	F	3	.5	1	.3	300	N	200	1	N	10	10	15
M- 39	F	2	.7	1.5	.3	300	N	300	1	N	10	70	15
M- 40	F	1.5	.3	1	.3	500	N	200	L	N	L	5	5
M- 41	F	10	.5	1.5	1	1,000	N	300	2	N	10	30	20
M- 42	F	1	.2	1	.2	500	N	200	L	N	L	5	10
M- 43	F	3	.7	1.5	.7	700	N	300	1	N	10	30	7
M- 44	F	1	.2	1	.3	150	N	100	N	N	N	L	N
M- 45	F	2	.5	1.5	.3	300	N	300	1	N	5	10	15
M- 46	F	2	.3	1	.5	500	N	300	1	N	5	15	10
M- 47	F	2	.5	1.5	.2	300	N	300	1.5	N	7	15	30
M- 48	F	1	.05	.3	.03.	700	N	700	1	N	N	10	L
M- 49	F	3	.7	1.5	.3	300	N	500	2	N	10	70	7
M- 51	F	3	.5	1.5	.7	700	N	500	2	N	10	20	10
M- 52	F	1.5	.3	1	.3	300	N	300	1	N	L	10	L
M- 53	F	1	.2	.3	.05	200	N	100	L	N	L	30	7
M- 54	F	3	.7	1	.3	500	N	500	2	N	7	20	15
M- 55	F	3	.7	1	.5	300	N	300	3	N	7	20	15
M- 56	G	1.5	.2	.5	.15	150	N	150	L	N	L	20	7
M- 57	G	1.5	.2	.5	.1	300	N	100	L	N	L	20	5
M- 60	G	2	.7	.7	.3	300	N	200	1	N	7	30	5
M- 61	G	1.5	.2	.5	.15	200	N	200	1	N	5	20	5
M- 62	G	3	.3	.7	.3	300	N	300	L	N	7	30	10

Breaks Primitive Area, Idaho and Lemhi Counties, Idaho

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
						Active stream sediment samples							
M- 2	200	N	30	L	15	N	100	10	50	N	700	0	7
M- 3	1,000	N	50	L	15	N	100	L	70	N	1,000	0	7
M- 4	150	N	20	N	15	N	150	10	30	N	300	0	9
M- 5	300	N	30	L	15	N	100	10	50	N	700	0	9
M- 6	150	N	20	L	10	N	100	L	30	N	500	0	5
M- 7	200	N	50	L	15	N	100	10	50	N	700	0	7
M- 9	150	N	30	L	15	N	100	L	30	N	500	0	5
M- 10	150	N	30	L	15	N	150	10	30	N	500	0	5
M- 11	100	N	15	L	15	N	150	15	30	N	700	0	5
M- 12	50	N	10	L	10	N	200	20	15	N	500	0	5
M- 13	20	N	L	15	15	N	300	20	10	N	150	0	3
M- 14	150	N	15	5	10	N	200	30	30	N	500	0	3
M- 15	150	N	15	10	10	N	200	30	30	N	300	0	3
M- 16	150	N	20	L	10	N	200	20	30	N	500	0	3
M- 17	150	N	10	15	10	N	200	20	20	N	150	0	3
M- 18	70	N	L	7	15	N	150	20	30	N	200	0	3
M- 19	N	N	N	N	10	N	N	L	20	N	15	0	5
M- 21	L	N	L	20	15	N	150	50	15	N	100	0	5
M- 23	N	N	L	L	L	N	N	15	15	N	100	0	1
M- 24	N	N	L	L	10	N	N	15	15	N	70	0	1
M- 25	N	N	N	N	N	N	N	L	15	N	10	0	1
M- 26	50	N	30	L	10	N	150	50	15	N	700	0	3
M- 27	20	N	20	L	L	N	150	30	15	N	300	0	3
M- 28	30	N	20	7	10	N	300	30	20	N	700	0	3
M- 29	70	N	15	5	15	N	200	20	30	N	300	0	1
M- 30	50	N	10	L	L	N	200	30	15	N	200	0	1
M- 31	70	N	10	7	15	N	300	30	15	N	200	0	3
M- 32	150	N	10	L	15	N	200	20	30	N	500	0	3
M- 33	100	N	L	5	15	N	300	20	15	N	150	0	1
M- 34	100	N	15	L	10	N	300	30	20	N	300	0	1
M- 35	70	N	10	L	15	N	300	30	20	N	300	0	3
M- 36	50	N	10	L	10	N	100	30	20	N	500	0	3
M- 37	70	N	10	7	15	N	200	30	20	N	150	0	1
M- 38	100	N	10	L	15	N	150	30	20	N	150	0	3
M- 39	50	N	10	15	10	N	200	30	20	N	200	0	3
M- 40	20	N	15	N	10	N	100	20	15	N	300	0	7
M- 41	150	N	30	L	L	N	100	50	30	N	G(1,000)	0	3
M- 42	N	N	10	N	L	N	150	20	10	N	300	0	7
M- 43	100	N	20	L	10	N	200	30	30	N	700	0	3
M- 44	N	N	N	N	L	N	100	15	10	N	150	0	3
M- 45	30	N	20	L	10	N	300	20	20	N	500	0	3
M- 46	70	N	30	L	L	N	200	20	20	N	700	0	5
M- 47	20	N	15	L	L	N	300	20	30	N	500	0	9
M- 48	N	N	N	N	L	N	N	30	L	N	100	0	5
M- 49	30	N	L	L	L	N	300	30	15	N	500	0	3
M- 51	50	N	30	L	L	N	300	30	20	N	1,000	0	3
M- 52	20	N	15	L	L	N	200	20	15	N	500	0	5
M- 53	N	N	N	L	10	N	N	15	10	N	10	0	5
M- 54	100	N	L	7	L	N	300	30	20	N	300	0	3
M- 55	150	N	15	L	10	N	200	30	30	N	700	0	1
M- 56	20	N	L	10	10	N	150	30	10	N	100	0	5
M- 57	N	N	L	10	L	N	100	30	10	N	20	0	7
M- 60	30	N	10	10	10	N	200	50	15	N	150	0	3
M- 61	30	N	10	7	L	N	150	30	20	N	150	0	5
M- 62	70	N	15	10	L	N	100	50	30	N	150	0	5

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
Active stream sediment samples--Continued													
M- 63	G	2	.7	.7	.2	300	N	300	1	N	10	50	7
M- 64	G	2	.7	.5	.2	300	N	700	1	N	10	50	15
M- 65	G	1.5	.7	1	.15	200	N	200	L	N	10	70	10
M- 66	G	3	1	.5	.3	300	N	300	L	N	15	100	30
M- 68	G	3	1.5	1.5	.15	300	N	300	L	N	15	200	5
M- 69	G	3	3	1.5	.3	500	N	300	L	N	20	300	15
M- 70	G	3	2	1.5	.3	300	N	500	L	N	20	150	20
M- 71	G	2	1.5	1.5	.2	300	N	300	L	N	15	150	30
M- 72	F	3	2	1.5	.15	500	N	300	L	N	15	200	15
M- 73	F	2	1	1.5	.2	300	N	300	1	N	15	70	15
M- 74	F	1.5	.7	1.5	.15	500	N	200	1.5	N	10	70	15
M- 75	F	3	2	2	.15	500	N	500	1	N	15	150	15
M- 76	F	1.5	.7	1	.1	300	N	200	2	N	10	70	15
M- 77	F	1.5	.7	.7	.1	300	N	150	1	N	10	70	15
M- 78	F	2	.7	1	.2	1,000	N	300	3	N	15	50	20
M- 79	F	1.5	.7	1	.15	300	N	150	L	N	10	70	10
M- 81	F	2	1	1	.15	300	N	300	2	N	15	100	20
M- 82	F	1	.5	1.5	.1	300	N	150	1	N	5	30	7
M- 83	F	1.5	.7	1	.15	500	N	200	2	N	7	50	30
M- 84	F	2	.7	1	.15	500	N	200	1	N	15	70	20
M- 85	F	2	.7	1	.15	300	N	200	1	N	10	70	10
M- 86	F	2	.7	1	.15	300	N	200	1.5	N	10	50	15
M- 87	F	2	1	1.5	.15	300	N	300	1	N	15	100	7
M- 96	D	1.5	.5	1.5	.15	300	N	700	1	N	7	15	7
M- 97	D	3	.7	1.5	.3	1,000	N	300	1	N	15	500	15
M- 98	D	3	2	1.5	.2	700	N	700	1	N	15	1,000	15
M- 99	D	2	.5	1	.15	500	N	700	1	N	10	300	10
M-100	D	2	.3	.7	.15	700	N	300	2	N	7	15	10
M-101	D	1	.3	1	.1	500	N	150	3	N	5	30	7
M-102	D	2	.7	1	.15	500	N	700	L	N	10	150	15
M-103	D	1.5	.3	.7	.15	500	N	300	2	N	5	15	10
M-104	D	2	.5	.7	.15	700	N	300	1.5	N	7	50	15
M-105	D	3	1.5	1	.3	700	N	500	1.5	N	15	100	15
M-106	D	3	.7	1	.3	300	N	500	1	N	15	70	20
M-107	D	3	1	.7	.3	300	N	500	1	N	20	200	20
M-108	D	1.5	.7	.7	.2	300	N	300	1	N	10	300	15
M-109	D	2	.7	1	.3	500	N	300	1	N	10	300	15
M-110	D	3	1	1.5	.3	500	N	500	1	N	15	200	15
M-111	D	2	.7	1	.3	300	N	500	1	N	10	50	15
M-112	D	3	1.5	2	.3	700	N	500	1	N	20	150	15
M-113	D	3	1.5	2	.5	700	N	700	1	N	20	150	15
M-114	D	3	2	1.5	.3	700	N	300	1	N	20	300	20
M-115	D	1.5	1	1.5	.2	500	N	300	1.5	N	10	70	20
M-116	D	.7	.3	1	.15	200	.5	150	2	N	L	70	30
M-117	D	3	1.5	1.5	.5	500	N	500	1	N	15	150	15
M-118	D	3	1.5	2	.5	500	N	500	1	N	15	200	15
M-151	D	3	3	3	.3	700	N	500	L	N	20	700	15
M-152	D	3	1	1.5	.3	700	N	500	1	N	15	300	15
M-153	D	3	2	1.5	.2	700	N	200	1	N	20	700	20
M-154	D	3	2	2	.3	700	N	300	1	N	20	500	30
M-155	D	3	1	1.5	.3	700	N	700	1	N	15	150	15
M-156	F	2	1	1	.2	300	N	200	1	N	15	100	15
M-160	G	1	.3	.7	.15	200	N	100	1.5	N	5	50	7
M-162	G	5	3	2	.3	1,500	N	200	1	N	20	300	15
M-163	G	3	1.5	1	.2	500	N	300	1	N	20	300	15

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
					Active stream sediment samples--Continued								
M- 63	50	N	L	10	L	N	150	20	30	N	150	0	3
M- 64	50	N	L	15	10	N	100	20	15	N	100	0	3
M- 65	30	N	L	10	L	N	200	20	20	N	150	0	5
M- 66	50	N	15	30	10	N	L	30	30	N	150	0	3
M- 68	50	N	L	15	L	N	300	30	15	N	150	0	3
M- 69	30	N	L	30	L	N	300	70	20	N	150	0	3
M- 70	30	N	L	30	L	N	300	30	15	N	150	0	3
M- 71	30	N	L	30	L	N	300	20	15	N	100	0	1
M- 72	30	N	L	70	15	N	300	50	15	N	100	0	5
M- 73	50	N	L	20	10	N	200	70	15	N	150	0	5
M- 74	20	N	L	15	15	N	200	50	15	N	150	0	5
M- 75	30	N	L	30	L	N	300	70	10	N	100	0	1
M- 76	20	N	L	20	15	N	150	30	15	N	100	0	7
M- 77	30	N	L	20	10	N	100	30	30	N	100	0	5
M- 78	50	L	10	15	30	N	150	30	30	N	150	0	3
M- 79	20	N	L	20	L	N	100	50	15	N	100	0	5
M- 81	100	N	L	30	20	N	150	50	50	N	150	0	3
M- 82	20	N	L	15	15	N	150	30	15	N	100	0	3
M- 83	30	N	10	15	15	N	150	30	20	N	150	0	3
M- 84	20	N	L	30	10	N	150	50	20	N	100	0	7
M- 85	L	N	L	20	L	N	150	30	15	N	200	0	5
M- 86	70	N	10	15	15	N	150	30	20	N	150	0	5
M- 87	30	N	L	20	10	N	200	30	15	N	150	0	1
M- 96	30	N	L	L	15	N	300	30	10	N	150		1
M- 97	L	N	10	15	15	N	200	70	10	N	200		24
M- 98	N	N	L	15	10	N	300	70	10	N	300		15
M- 99	N	N	L	5	15	N	300	50	L	N	100		3
M-100	N	N	L	L	15	N	150	50	15	N	100		8
M-101	50	N	L	L	15	N	150	30	30	N	50		9
M-102	20	N	L	5	15	N	300	30	10	N	100		5
M-103	N	N	L	L	15	N	200	30	10	N	100		8
M-104	L	N	L	L	15	N	200	70	15	N	100		8
M-105	20	N	L	15	20	N	200	100	15	L	150		3
M-106	20	N	L	20	20	N	300	70	15	N	150		3
M-107	20	N	L	30	30	N	200	70	10	N	150		3
M-108	N	N	L	15	15	N	200	30	10	N	100		5
M-109	L	N	L	15	15	N	200	50	15	N	150		5
M-110	20	N	L	30	10	N	300	50	15	N	100		3
M-111	70	N	L	15	15	N	300	30	15	N	70		3
M-112	70	N	10	30	10	N	300	50	20	N	70		3
M-113	20	N	L	30	10	N	300	70	15	N	100		3
M-114	30	N	L	50	50	N	200	70	15	L	50		5
M-115	30	N	L	15	20	N	200	30	10	N	70		30
M-116	L	N	L	7	15	N	100	30	20	N	20		24
M-117	20	N	L	20	15	N	300	50	15	N	300		9
M-118	30	N	L	20	15	N	300	50	15	N	200		5
M-151	20	N	L	30	10	N	300	70	15	N	70		5
M-152	30	N	L	20	15	N	300	50	15	N	200		5
M-153	L	N	L	70	15	N	150	70	15	N	50		5
M-154	20	N	L	70	15	N	200	70	15	N	200		3
M-155	50	N	10	30	15	N	300	50	15	N	150		3
M-156	L	N	L	30	10	N	150	50	10	N	70		1
M-160	L	N	L	5	15	N	L	30	10	N	50		3
M-162	30	N	L	70	L	N	200	100	70	N	200		3
M-163	20	N	L	30	15	N	200	70	15	N	150		1

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Active stream sediment samples--Continued							
M-164	G	3	1	1	.2	500	N	500	1	N	10	70	15
M-165	G	3	3	3	.3	1,000	N	300	L	N	15	300	15
M-166	G	3	1	.7	.2	700	N	150	1.5	N	10	70	15
M-167	G	1.5	.5	.7	.15	700	N	300	1.5	N	7	30	15
M-168	G	1	.7	.7	.15	300	N	200	1	N	5	70	10
M-169	G	1.5	.5	.7	.15	300	N	200	1	N	7	30	10
M-171	G	.7	.2	.5	.07	200	N	100	L	N	L	20	7
M-172	D	3	1	1	.3	1,000	N	700	1	N	10	50	10
M-173	D	2	1	1	.3	700	N	500	1	N	10	70	10
M-174	D	.3	.2	.5	.1	100	N	150	1	N	5	20	10
M-175	D	1.5	.7	1	.2	300	N	500	1.5	N	7	30	15
M-176	D	.2	.15	.3	.05	150	N	70	5	N	L	30	7
M-177	D	3	1	1	.3	700	N	300	L	N	10	70	10
M-178	D	5	3	1.5	.5	1,000	N	200	2	N	20	500	15
M-179	D	2	1	1.5	.3	700	N	300	1.5	N	10	70	10
M-180	D	2	.7	1	.3	700	N	300	1.5	N	15	70	10
M-181	D	3	1.5	1	.3	700	N	300	1	N	15	70	15
M-182	D	1.5	.7	.7	.2	500	N	200	1.5	N	10	30	10
M-183	D	3	.5	1	.3	300	N	300	1.5	N	10	50	20
M-184	D	3	2	2	.5	500	N	700	1.5	N	15	150	15
M-185	D	1.5	.5	1	.15	500	N	300	2	N	L	20	10
M-186	D	3	1.5	2	.3	500	N	700	1	N	15	70	10
M-187	D	5	2	3	.3	700	N	500	1	N	15	70	20
M-188	D	3	1.5	2	.2	500	N	700	1	N	10	50	15
M-189	G	3	2	3	.3	700	N	500	1	N	20	200	15
M-190	G	3	2	2	.2	500	N	500	1	N	15	150	15
M-191	D	3	2	2	.2	700	N	300	1	N	20	150	15
M-192	D	3	2	1.5	.2	700	N	700	1.5	N	15	150	15
M-193	D	2	1	1	.2	300	N	300	1	N	15	150	15
M-194	D	2	1	1	.15	500	N	200	1	N	15	70	15
M-195	D	3	1.5	1	.3	700	L	500	1.5	N	20	150	20
M-196	D	3	2	2	.2	700	N	500	1	N	20	150	15
M-197	B	2	1.5	1.5	.2	700	N	700	1	N	10	70	10
M-199	B	5	1	1.5	G(1)	1,000	N	500	3	N	10	70	15
M-200	B	3	2	2	.5	700	N	500	1	N	15	100	15
M-261	B	3	.3	.7	.3	300	.5	300	3	N	5	15	15
M-262	B	3	.2	.7	.3	200	N	500	1.5	N	L	10	15
M-263	B	1	.2	.7	.2	300	N	200	3	N	N	5	10
M-264	B	3	.5	.7	.5	500	N	300	1.5	N	10	50	15
M-265	B	2	.7	.7	.3	200	N	300	2	N	10	50	15
M-266	B	1.5	.7	.7	.3	200	N	500	2	N	7	70	10
M-267	B	3	.7	1	.3	700	N	300	2	N	10	50	15
M-268	B	3	.7	1	.3	700	N	300	1.5	N	7	50	15
M-269	B	.7	.2	.5	.1	500	N	150	1	N	L	20	7
M-270	B	2	1	1	.2	700	N	300	3	N	10	70	7
M-271	B	2	.7	.7	.2	500	N	300	3	N	10	70	10
M-272	D	2	.7	1	.3	500	N	500	2	N	10	70	15
M-273	D	1.5	.7	.7	.15	500	L	200	1	N	10	200	15
M-274	D	3	2	1.5	.2	500	L	500	1	N	15	500	7
M-275	D	1.5	1	.7	.15	300	L	200	1	N	10	200	10
M-276	D	.15	.07	.5	.15	70	N	100	1	N	N	L	L
M-278	G	3	1	1.5	.3	700	N	700	1	N	10	70	20
M-279	G	3	1.5	1.5	.3	1,000	N	300	L	N	15	150	15
M-280	G	2	1.5	1.5	.2	700	N	200	1	N	10	100	5
M-281	G	2	1	1.5	.15	500	L	300	L	N	10	70	15

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
					Active stream sediment samples--Continued								
M-164	20	N	L	20	15	N	300	50	15	N	200		3
M-165	100	N	L	30	10	N	500	70	30	N	70		1
M-166	L	N	L	15	15	N	100	70	15	N	150		1
M-167	L	N	L	7	15	N	200	50	15	N	100		5
M-168	L	N	L	15	15	N	150	50	10	N	70		3
M-169	N	N	L	10	10	N	150	50	10	N	100		5
M-171	N	N	L	L	15	N	N	30	10	N	30		1
M-172	150	N	10	5	10	N	300	50	20	N	300		5
M-173	70	N	30	7	15	N	300	70	30	N	200		8
M-174	N	N	L	L	15	N	L	20	10	N	50		0
M-175	20	N	L	10	15	N	300	30	15	N	100		1
M-176	N	N	L	L	10	N	N	15	10	N	10		1
M-177	150	N	L	20	15	N	300	30	15	N	70		3
M-178	N	N	L	150	10	N	200	100	20	N	700		3
M-179	L	N	L	20	15	N	300	70	15	N	100		5
M-180	50	N	L	30	10	N	300	30	15	N	150		5
M-181	20	N	L	30	15	N	300	50	15	N	150		3
M-182	30	N	L	15	10	N	200	30	15	N	70		8
M-183	L	N	L	10	15	N	200	50	10	N	100		1
M-184	20	N	L	20	15	N	300	30	15	N	150		5
M-185	N	N	L	7	15	N	200	30	L	N	70		13
M-186	70	N	L	15	10	N	300	50	15	N	150		9
M-187	30	N	10	20	15	N	300	50	15	N	150		7
M-188	20	N	L	15	10	N	300	30	10	N	70		3
M-189	50	N	10	20	10	N	300	70	20	N	100		5
M-190	30	N	L	20	15	N	300	50	15	N	100		5
M-191	100	N	L	70	15	N	300	70	20	N	100		3
M-192	30	N	L	20	15	N	300	50	15	N	200		7
M-193	L	N	L	30	15	N	300	50	10	N	200		7
M-194	20	N	L	50	15	N	300	30	10	N	70		5
M-195	20	N	L	70	20	N	200	70	10	N	150		5
M-196	100	N	L	50	15	N	300	70	15	N	70		1
M-197	100	N	L	20	15	N	300	30	10	N	200		3
M-199	700	N	50	5	15	N	150	20	70	N	1,000		3
M-200	L	N	L	10	15	N	300	50	15	N	70		1
M-261	50	N	L	5	10	N	L	30	100	N	G(1,000)		5
M-262	70	N	10	L	10	N	100	20	50	N	700		1
M-263	L	N	15	L	30	L	L	10	15	N	200		1
M-264	30	N	10	5	10	N	150	50	15	N	300		1
M-265	L	N	L	5	15	N	150	50	20	N	500		1
M-266	N	N	L	7	10	N	200	30	15	N	200		1
M-267	100	N	10	7	15	N	200	50	30	N	200		1
M-268	70	N	L	7	15	N	200	50	15	N	150		3
M-269	N	N	N	L	10	N	L	20	10	N	30		5
M-270	N	N	L	7	15	N	300	30	20	N	100		7
M-271	L	N	L	7	15	N	200	30	15	N	100		1
M-272	L	N	L	10	15	N	200	50	15	N	150		5
M-273	N	L	L	20	10	N	150	50	15	N	150		3
M-274	20	N	L	20	10	N	300	70	20	N	150		1
M-275	L	N	L	20	10	N	150	70	15	N	50		9
M-276	50	N	N	L	L	N	N	20	10	N	20		1
M-278	L	N	L	50	15	N	200	70	15	N	150		1
M-279	150	N	L	70	15	N	200	70	30	N	70		3
M-280	30	N	L	30	10	N	200	50	15	N	100		1
M-281	30	N	L	30	10	N	300	50	15	N	70		1

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

		Semiquantitative spectrographic analyses											
		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
Active stream sediment samples--Continued													
M-282	G	3	1.5	1.5	.3	700	N	500	1	N	10	100	10
M-283	G	3	1.5	1.5	.3	700	N	500	1	N	10	70	15
M-284	G	3	1.5	1.5	.3	700	N	500	1	N	15	100	20
M-285	G	3	1.5	3	.3	700	N	300	L	N	15	100	15
M-286	G	3	1	1.5	.3	500	N	300	1	N	15	70	15
M-289	G	3	1	2	.3	700	N	300	1	N	10	100	15
M-290	G	3	.7	1.5	.3	700	N	300	1	N	15	100	15
M-291	G	3	1	1.5	.3	500	N	500	1	N	15	70	15
M-293	B	3	.5	1	.3	150	N	700	1.5	N	7	20	7
M-325	B	1.5	.5	.7	.2	300	N	200	2	N	L	20	10
M-326	B	5	3	1.5	.7	700	N	700	1	N	20	150	10
M-327	B	5	3	1	.7	500	N	700	2	N	20	150	20
M-328	B	5	3	1.5	.7	1,000	N	700	1	N	20	150	10
M-329	B	2	.7	2	.3	1,000	N	500	1	N	10	70	10
M-330	B	3	1	1.5	.5	300	N	700	1	N	10	100	5
M-331	B	3	1	1.5	.5	300	N	700	1	N	20	200	5
M-332	B	5	1.5	1.5	.7	300	N	500	1	N	20	300	7
M-333	B	5	3	1.5	.5	500	N	700	1	N	30	500	10
M-334	B	5	2	1.5	.5	1,000	N	700	1	N	20	150	10
M-335	B	5	2	1.5	.5	1,000	N	700	1	N	20	150	10
M-336	E	7	3	2	.5	700	N	700	L	N	20	500	10
M-337	E	7	3	2	.5	700	N	500	L	N	20	500	30
M-338	E	7	5	3	.7	1,000	N	500	L	N	20	500	20
M-339	E	7	3	3	G(1)	700	N	1,000	L	N	20	300	20
M-340	E	7	3	5	.7	700	N	700	L	N	20	500	70
M-341	E	7	3	2	.7	700	N	700	L	N	20	500	70
M-342	E	7	3	1	.7	700	N	700	L	N	20	200	70
M-343	E	5	3	1.5	.7	500	N	1,000	L	N	20	200	70
M-344	E	5	.7	1	.7	1,000	N	500	L	N	5	20	5
M-345	C	7	2	3	.7	700	N	1,000	L	N	20	200	10
M-346	C	5	2	2	.7	500	N	700	L	N	10	200	5
M-347	C	5	3	3	.3	500	N	700	L	N	10	200	5
M-348	C	5	3	2	.7	500	N	700	L	N	20	200	10
M-349	C	7	3	2	.7	500	N	700	L	N	20	300	10
M-351	A	2	.7	.7	.3	500	1	700	5	N	5	70	5
M-353	A	3	.7	1	.3	700	N	700	L	N	5	70	5
M-354	A	5	1	1	1	1,500	N	500	L	N	5	70	5
M-355	A	5	.7	1	.7	500	N	500	L	N	5	70	5
M-356	A	5	2	1	1	300	N	700	L	N	10	150	5
M-358	A	5	2	2	1	500	N	700	L	N	10	150	10
M-359	A	5	3	2	G(1)	500	N	700	L	N	50	150	10
M-360	A	7	3	2	G(1)	1,000	N	700	L	N	20	300	10
M-361	A	5	1	.7	.5	300	N	700	L	N	100	100	10
M-551	G	7	3	2	1	500	N	1,000	L	N	20	150	20
M-553	G	7	3	5	1	500	N	1,000	L	N	20	150	20

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
					Active stream sediment samples--Continued								
M-282	100	N	L	50	10	N	300	70	70	N	300		1
M-283	N	N	L	30	15	N	300	50	20	N	20		1
M-284	70	N	10	20	10	N	200	70	20	N	500		1
M-285	30	N	L	50	10	N	300	50	20	N	300		13
M-286	30	N	L	20	15	N	300	30	15	N	100		7
M-289	70	N	L	30	15	N	300	50	20	N	100		1
M-290	50	N	L	30	15	N	300	50	20	N	300		1
M-291	50	N	L	30	15	N	300	50	30	N	300		1
M-293	50	N	L	5	15	N	300	30	15	N	150		1
M-325	70	L	10	10	10	N	200	30	15	L	100	L(1)	4
M-326	70	L	10	30	20	N	500	100	20	L	200	1	2
M-327	70	L	10	50	20	N	300	100	20	L	200	1	2
M-328	150	L	10	50	20	N	300	100	50	L	500	1	2
M-329	50	L	L	20	20	N	300	70	20	L	100	L(1)	4
M-330	150	L	10	20	20	N	500	70	30	L	500	1	3
M-331	150	L	10	20	20	N	200	70	30	L	700	1	2
M-332	150	L	10	50	20	N	200	100	30	L	200	L(1)	2
M-333	150	L	10	100	20	N	200	100	30	L	700	1	2
M-334	150	L	10	20	20	N	200	150	50	L	1,000	1	3
M-335	200	L	10	20	20	N	200	150	30	L	700	1	2
M-336	L	L	10	150	20	N	500	150	20	N	200	2	1
M-337	150	L	10	200	20	N	300	150	100	N	200	2	3
M-338	150	L	10	200	20	N	300	200	50	N	700	2	1
M-339	200	L	20	100	20	N	500	200	50	N	1,000	2	1
M-340	150	L	10	200	20	N	500	200	50	N	150	4	4
M-341	100	L	10	200	20	N	200	200	30	N	200	4	4
M-342	100	L	10	100	20	N	200	200	20	N	200	4	4
M-343	100	L	10	50	50	N	500	100	30	N	700	4	4
M-344	300	L	20	L	50	N	200	100	100	N	700	1	2
M-345	100	L	10	100	20	N	500	150	20	N	200	2	2
M-346	100	L	10	20	20	N	500	100	20	N	G(1,000)	2	1
M-347	50	L	10	50	20	N	500	100	20	N	300	2	2
M-348	100	L	10	70	20	N	500	150	20	N	200	2	2
M-349	50	L	10	100	30	N	500	150	20	N	300	2	2
M-351	50	L	10	10	20	N	200	50	20	N	150	2	7
M-353	150	L	20	10	50	N	200	50	50	N	200	2	5
M-354	100	L	20	10	20	100	200	100	70	N	500	4	8
M-355	100	L	20	10	20	N	200	70	G(200)	N	500	2	7
M-356	150	L	20	10	50	N	200	150	100	N	500	1	5
M-358	150	L	20	30	20	N	200	150	70	N	300	1	5
M-359	200	L	20	30	20	N	300	150	70	N	1,000	1	4
M-360	150	L	20	30	10	N	500	150	70	N	1,000	1	2
M-361	100	L	20	20	30	N	300	100	20	N	700	5	3
M-551	500	L	20	20	20	N	300	150	G(200)	L	G(1,000)	1	2
M-553	200	L	20	20	10	N	300	70	100	L	G(1,000)	1	1

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
Active stream sediment samples--Continued													
M-554	G	7	3	2	1	700	N	700	L	N	20	300	20
M-556	E	5	2	2	.5	500	N	700	L	N	20	100	10
M-557	E	5	2	2	.3	500	N	500	L	N	20	150	10
M-558	E	7	5	7	G(1)	5,000	N	1,000	L	N	30	300	20
M-562	E	5	3	2	.5	700	N	700	L	N	20	150	10
M-565	A	5	3	2	1	700	N	500	1	N	20	200	10
M-566	A	7	5	7	G(1)	700	N	500	L	N	30	150	10
M-567	A	7	3	5	G(1)	700	N	700	L	N	20	200	10
M-568	A	7	5	2	1	700	N	700	L	N	30	300	10
M-569	A	7	3	1	1	1,500	N	1,000	L	N	50	200	10
M-570	A	7	3	2	1	500	N	500	L	N	30	300	10
M-572	A	5	2	2	1	200	N	700	L	N	20	100	10
M-574	A	5	3	5	1	500	N	700	L	N	20	100	10
M-575	A	5	3	5	.7	1,000	N	1,000	L	N	20	300	10
M-576	A	5	2	1.5	1	500	N	700	1	N	20	200	10
M-577	A	5	2	1	1	500	N	700	L	N	20	300	10
M-578	A	3	3	1	1	500	N	700	L	N	20	300	10
M-601	E	1.5	.5	.7	.2	700	N	300	L	N	15	100	20
M-602	E	2	1	.7	.2	500	N	500	L	N	20	200	30
M-603	E	1.5	.7	.5	.3	700	N	700	N	N	20	150	20
M-604	E	1.5	.7	.7	.3	200	N	500	L	N	15	70	20
M-605	E	1.5	1	1	.2	700	N	500	1	N	15	150	15
M-606	E	2	1	.7	.3	700	N	500	L	N	20	150	30
M-607	E	1.5	.5	.7	.2	500	N	500	3	N	15	70	20
M-609	E	1.5	.7	1	.3	200	N	500	L	N	10	150	15
M-610	E	2	.7	1	.3	700	N	700	1	N	15	70	70
M-611	B	1.5	.3	.7	.2	700	N	500	1.5	N	15	30	15
M-613	B	1	.2	.2	.3	150	N	300	1	N	7	20	70
M-616	D	1.5	2	1	.15	500	N	300	L	N	30	1,500	20
N- 1	G	5	.3	1	.5	700	N	300	3	N	5	20	15
N- 2	G	2	.3	1	.2	300	N	700	1.5	N	L	15	10
N- 3	G	3	.7	1	.3	300	N	300	1.5	N	7	20	15
N- 4	G	3	.7	1.5	.3	700	N	500	1	N	10	15	15
N- 5	G	2	.5	1	.3	300	N	700	1	N	7	15	10
N- 6	G	2	.3	1	.3	300	N	300	2	N	5	10	15
N- 7	G	2	.3	1	.3	300	N	300	2	N	7	15	7
N- 8	G	3	.3	1	.3	300	N	700	1	N	7	10	10
N- 9	G	2	.3	1	.2	300	N	300	1	N	7	15	7
N- 10	G	3	.5	1	.5	300	N	700	1	N	7	15	7
N- 11	G	2	.7	.7	.3	300	N	500	1	N	7	20	7
N- 12	G	3	.5	1	.3	300	N	500	1	N	7	20	10
N- 13	G	1	.1	.5	.07	200	N	100	7	N	N	7	7
N- 14	G	1	.1	.3	.07	300	N	150	5	N	N	5	15
N- 15	G	1	.15	.7	.1	300	N	200	5	N	N	5	15

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

	Semiquantitative spectrographic analyses (ppm)										Chemical analyses (ppm)	
Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
					Active stream sediment samples--Continued								
M-554	300	L	20	20	10	N	200	150	100	L	G(1,000)	L(1)	2
M-556	50	L	10	20	15	N	500	100	20	L	500	1	2
M-557	50	L	10	50	20	N	200	100	20	L	500	2	2
M-558	300	L	20	50	20	N	500	200	100	L	G(1,000)	1	2
M-562	100	L	10	50	20	N	200	150	20	L	200	2	1
M-565	100	L	20	20	20	N	200	150	50	L	500	1	4
M-566	50	L	20	20	15	N	500	200	50	L	200	1	4
M-567	300	L	20	20	20	N	500	100	100	L	G(1,000)	2	9
M-568	100	L	20	20	20	N	200	100	70	L	G(1,000)	2	6
M-569	50	L	10	20	20	N	200	100	20	L	300	1	7
M-570	150	L	20	30	20	N	300	100	50	L	500	1	4
M-572	150	L	10	20	20	N	300	100	20	L	500	1	3
M-574	100	L	10	20	10	N	300	100	30	L	500	1	4
M-575	100	L	10	20	20	N	300	100	50	L	1,000	1	2
M-576	100	L	10	20	20	N	300	100	50	L	500	1	6
M-577	200	L	10	20	20	N	300	100	200	L	500	1	4
M-578	150	L	10	20	15	N	300	70	100	L	500	1	2
M-601	20	N	L	70	15	N	150	70	15	N	100	38	5
M-602	L	N	L	100	20	N	200	70	20	N	200	34	0
M-603	L	N	L	100	20	N	100	70	15	N	150	34	5
M-604	30	N	L	50	20	N	150	50	15	N	100	20	1
M-605	70	N	L	70	20	N	300	50	20	N	70	22	0
M-606	30	N	L	100	15	N	150	70	20	N	150	30	0
M-607	50	N	L	50	20	N	300	50	30	N	150	24	0
M-609	70	N	L	70	15	N	200	50	30	N	100	20	0
M-610	50	N	L	70	30	N	300	70	70	N	100	28	1
M-611	100	N	L	L	20	N	200	20	20	N	150	L(10)	0
M-613	20	N	10	7	30	N	100	30	15	N	150	L(10)	0
M-616	L	N	L	70	20	N	150	70	15	N	70	14	0
N- 1	500	N	70	L	10	N	L	10	70	N	700	0	3
N- 2	150	N	10	5	15	N	200	15	15	N	200	0	3
N- 3	300	N	15	5	15	N	150	30	30	N	500	0	3
N- 4	150	N	10	L	10	N	200	30	30	N	300	0	5
N- 5	70	N	10	L	10	N	150	20	20	N	200	0	3
N- 6	300	N	30	L	15	N	150	20	30	N	700	0	3
N- 7	300	N	30	L	15	N	100	20	30	N	500	0	5
N- 8	200	N	20	L	10	N	200	30	30	N	300	0	1
N- 9	100	N	10	L	L	N	150	30	30	N	500	0	3
N- 10	100	N	20	L	15	N	150	30	30	N	500	0	3
N- 11	100	N	10	7	15	N	150	30	20	N	300	0	3
N- 12	150	N	15	5	10	N	150	30	30	N	500	0	3
N- 13	150	N	15	L	15	N	N	L	50	N	100	0	1
N- 14	150	N	20	L	15	N	N	L	30	L	150	0	5
N- 15	70	N	10	5	20	N	150	15	30	N	100	0	1

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
Active stream sediment samples--Continued													
N- 16	G	1.5	.3	1	.15	300	N	500	2	N	5	10	5
N- 17	G	1.5	.2	.7	.15	150	N	300	3	N	5	7	15
N- 18	G	3	.3	1	.2	300	N	700	2	N	7	10	10
N- 19	E	3	1.5	1.5	.15	700	N	300	L	N	10	100	15
N- 20	E	2	.7	1.5	.1	700	N	300	1	N	10	100	15
N- 21	E	3	1.5	1.5	.2	300	N	300	L	N	15	150	15
N- 22	E	3	1	1.5	.2	300	N	300	1	N	15	100	20
N- 23	E	1.5	.5	1.5	.15	300	N	300	1	N	5	70	10
N- 24	E	1.5	.7	1	.15	300	N	150	1	N	7	70	20
N- 25	E	3	1	1.5	.3	500	N	500	1	N	15	150	30
N- 26	E	1.5	.5	1.5	.1	300	L	150	L	N	5	70	15
N- 27	E	.7	.2	1	.07	150	N	100	L	N	N	30	7
N- 28	E	3	2	2	.3	500	N	500	L	N	15	150	20
N- 29	G	3	.7	1	.5	500	N	700	1.5	N	15	15	15
N- 30	G	2	.7	1.5	.3	500	N	700	1.5	N	15	15	15
N- 31	G	3	.7	1.5	.5	700	N	500	1	N	15	20	15
N- 32	G	2	.7	1	.3	500	N	300	1	N	10	10	10
N- 33	G	1.5	.5	.7	.3	500	N	500	1	N	7	15	15
N- 34	G	2	.7	.3	.2	300	N	1,000	L	N	15	50	15
N- 35	G	1.5	.5	.2	.15	200	N	1,000	L	N	10	30	15
N- 36	G	3	.5	.7	.3	1,000	N	700	1	N	10	30	20
N- 37	G	2	.3	.7	.3	500	N	500	1.5	N	10	30	15
N- 38	G	3	.5	.5	.3	300	N	1,500	L	N	10	30	15
N- 39	G	3	.5	.7	.3	700	N	700	1	N	10	30	50
N- 40	G	3	.3	.7	.3	150	N	700	L	N	10	70	15
N- 41	G	3	.5	.7	.3	300	N	500	3	N	10	30	50
N- 42	G	3	.3	.3	.3	150	N	700	L	N	7	30	5
N- 43	G	1.5	.2	.3	.3	200	N	700	L	N	5	15	15
N- 45	G	3	.5	.7	.3	200	N	500	1.5	N	10	30	10
N- 46	G	3	.3	.7	.3	200	N	500	1.5	N	10	30	15
N- 47	G	5	.3	.5	.3	200	N	700	L	N	7	30	7
N- 48	G	3	.3	.3	.2	300	N	700	L	N	10	30	15
N- 49	G	3	1.5	2	.3	300	N	300	1	N	10	70	15
N- 50	G	3	1	1.5	.3	500	N	300	1	N	10	50	15
N- 51	G	3	.7	1	.3	300	N	300	1	N	10	70	7
N- 52	G	3	1.5	2	.3	700	N	300	L	N	15	300	15
N- 53	G	1.5	.7	1	.2	300	N	300	1	N	10	70	7
N-101	F	2	.7	.7	.2	300	N	300	1	N	10	30	15
N-103	F	3	1.5	2	.3	500	N	500	L	N	15	150	10
N-104	F	5	3	2	.3	700	N	200	1	N	30	500	15
N-105	F	3	.7	1	.2	300	N	700	1.5	N	7	50	10
N-106	F	2	.7	.7	.3	300	N	500	1.5	N	10	70	10
N-107	F	3	1.5	1.5	.3	300	N	500	1	N	15	70	15
N-108	F	3	2	1.5	.3	300	N	500	1.5	N	30	200	15
N-109	F	3	1.5	1.5	.5	500	N	500	1.5	N	20	150	15
N-110	F	3	1	1.5	.2	500	N	500	1	N	15	70	10
N-111	E	2	.7	1	.2	500	N	500	1	N	10	50	15
N-112	E	2	.7	1	.2	300	L	300	1	N	15	50	10
N-113	E	3	1	1	.2	500	N	700	1	N	15	70	15
N-114	E	3	.7	1	.2	700	L	500	1.5	N	15	70	15
N-115	E	3	.7	1	.2	500	N	500	1	N	15	100	50
N-117	E	3	.7	1.5	.3	700	N	500	1	N	15	70	20
N-118	E	5	2	1.5	.3	700	N	500	L	N	20	200	30
N-119	E	5	2	2	.3	700	N	500	L	N	20	200	30
N-120	E	5	2	3	1	700	N	500	L	N	20	70	30

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
						Active stream sediment samples--Continued							
N- 16	50	N	10	5	15	N	100	15	20	N	150	0	1
N- 17	70	N	10	L	15	N	L	15	15	N	150	0	3
N- 18	200	N	15	L	15	N	150	15	30	N	300	0	3
N- 19	50	N	L	30	15	N	150	70	20	N	200	0	3
N- 20	150	N	L	30	15	N	200	30	30	N	300	0	3
N- 21	30	N	L	50	15	N	200	50	30	N	70	0	3
N- 22	20	N	L	70	15	N	200	70	15	N	200	0	3
N- 23	30	N	L	15	10	N	200	30	15	N	150	0	3
N- 24	20	N	L	20	10	N	150	50	15	N	150	0	3
N- 25	30	N	L	30	10	N	200	70	15	N	150	0	3
N- 26	L	N	L	15	L	N	150	30	20	N	100	0	5
N- 27	L	N	L	L	L	N	150	15	10	N	150	0	3
N- 28	30	N	L	70	15	N	300	70	30	N	70	0	1
N- 29	100	N	20	L	15	N	300	30	30	N	700		1
N- 30	100	N	15	L	15	N	300	30	30	N	1,000		9
N- 31	70	N	15	L	15	N	300	50	30	N	700		3
N- 32	150	N	15	L	L	N	200	30	50	N	500		1
N- 33	100	N	10	L	10	N	200	30	30	N	200		1
N- 34	30	N	L	15	10	N	100	50	20	N	150		1
N- 35	30	N	L	10	10	N	100	30	15	N	200		1
N- 36	50	N	10	10	15	N	150	50	30	N	300		8
N- 37	30	N	10	7	15	N	100	30	30	N	200		5
N- 38	70	N	L	15	10	N	100	30	150	N	200		1
N- 39	20	N	10	10	15	N	100	30	20	N	300		8
N- 40	70	N	L	10	15	N	150	50	30	N	300		5
N- 41	30	N	10	7	15	N	100	50	70	N	300		5
N- 42	30	N	L	7	10	N	100	30	15	N	150		3
N- 43	30	N	L	5	10	N	150	30	15	N	200		1
N- 45	50	N	L	15	10	N	150	50	30	N	500		8
N- 46	150	N	10	7	10	N	100	30	200	N	700		5
N- 47	100	N	10	7	10	N	100	50	G(200)	N	300		18
N- 48	20	N	10	10	10	N	100	30	30	N	200		5
N- 49	20	N	10	15	10	N	500	30	15	N	200		8
N- 50	70	N	10	7	15	N	300	30	15	N	200		8
N- 51	30	N	L	15	15	N	300	30	10	N	200		5
N- 52	30	N	15	15	10	N	300	70	20	N	300		13
N- 53	30	N	L	10	15	N	200	30	15	N	150		18
N-101	50	N	L	10	15	N	150	20	15	N	150		9
N-103	100	N	10	15	L	N	300	30	15	N	200		1
N-104	150	N	15	30	10	N	150	70	30	N	300		3
N-105	100	N	L	5	15	N	150	20	30	N	150		3
N-106	100	N	10	7	10	N	200	30	30	N	150		9
N-107	30	N	L	30	20	N	200	50	20	N	200		8
N-108	70	N	L	50	15	N	200	50	20	N	300		3
N-109	100	N	15	20	10	N	300	50	20	N	500		5
N-110	150	N	15	10	15	N	200	30	30	N	300		3
N-111	50	N	L	L	10	N	300	30	15	N	300		5
N-112	150	N	L	15	15	N	300	50	30	N	100		5
N-113	70	N	L	20	15	N	300	30	30	N	100		3
N-114	150	N	L	20	20	N	300	50	50	N	100		3
N-115	100	N	L	30	15	N	300	50	30	N	200		5
N-117	L	N	L	20	20	N	300	50	15	N	70		5
N-118	L	N	L	150	20	N	300	70	15	L	100		30
N-119	L	N	L	70	15	N	300	50	15	L	150		8
N-120	20	N	10	20	15	N	500	70	20	N	200		8

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Active stream sediment samples--Continued							
N-121	E	3	3	2	.3	1,000	N	300	L	N	20	150	15
N-122	E	3	2	2	.3	1,000	N	300	1	N	20	150	15
N-123	E	2	1	1.5	.15	500	N	500	1	N	10	70	10
N-124	E	2	.7	1	.2	500	N	300	1.5	N	10	30	15
N-125	E	3	2	2	.3	1,000	N	300	1	N	15	300	20
N-126	E	2	1.5	2	.3	500	N	500	1	N	15	300	15
N-127	E	2	1	1.5	.3	300	N	300	1	N	10	70	15
N-128	D	3	1.5	2	.7	700	N	700	1	N	15	70	15
N-129	D	5	2	2	.5	700	N	700	L	N	20	150	15
N-130	D	3	2	1.5	.5	700	N	500	L	N	20	150	15
N-131	D	3	2	2	.3	700	N	300	1	N	20	200	15
N-132	D	3	2	2	.3	700	N	300	L	N	20	200	15
N-133	D	1.5	.7	1	.2	500	N	300	1	N	10	100	15
N-134	D	2	1	1.5	.3	700	L	300	1.5	N	15	700	15
N-135	D	2	.7	1	.2	300	L	300	1.5	N	15	100	15
N-136	D	2	.7	1.5	.2	500	N	700	1	N	10	50	15
N-137	D	3	1	1.5	.3	700	L	300	1	N	15	200	15
N-138	D	2	.7	1	.15	500	N	700	1	N	10	50	10
N-139	D	2	.7	1	.2	700	L	300	2	N	10	70	15
N-140	D	3	1	1.5	.3	1,000	L	500	1	N	15	500	15
N-141	D	3	1	1.5	.5	700	L	300	1.5	N	15	150	30
N-142	F	3	1.5	1.5	.3	700	L	500	1	N	20	150	15
N-143	F	3	1.5	2	.5	700	N	700	1	N	20	100	15
N-144	F	3	.7	1.5	.3	700	N	700	L	N	15	30	15
N-145	F	5	3	3	.7	1,000	N	700	1	N	30	150	15
N-146	F	5	1.5	2	.5	700	N	700	L	N	20	150	15
N-147	F	3	2	2	.3	1,000	N	500	L	N	20	300	15
N-148	F	3	2	1.5	.5	700	N	700	1	N	15	70	15
N-149	F	5	2	1.5	.5	700	N	700	1	N	15	150	15
N-150	F	5	1.5	2	.5	1,000	N	700	1	N	15	15	20
N-151	F	2	.3	.7	.2	300	N	500	L	N	L	30	15
N-152	F	5	2	1.5	.3	1,000	N	500	1	N	20	100	20
N-153	F	3	1.5	1.5	.5	1,000	L	300	1.5	N	15	70	15
N-154	F	5	2	3	.5	1,000	N	500	1	N	20	150	20
N-155	F	2	1.5	2	.3	700	L	300	1	N	15	100	15
N-156	F	3	1.5	1.5	.5	700	N	700	1.5	N	10	70	20
N-157	F	5	3	2	.7	1,000	N	700	1	N	20	200	15
N-158	F	5	1.5	2	.5	1,000	N	700	1	N	15	50	15
N-159	F	3	2	2	.5	700	N	700	1	N	15	150	20
N-160	F	3	2	2	.3	700	L	500	1	N	20	200	15
N-161	F	3	1.5	1.5	.3	500	N	500	1	N	15	100	10
N-162	F	3	2	1.5	.5	700	N	700	1	N	20	70	15
N-163	F	2	1.5	1.5	.3	700	N	500	L	N	15	500	10
N-164	F	3	2	2	.5	700	N	700	1	N	20	150	15
N-165	F	3	2	1.5	.3	500	N	700	1	N	15	100	15
N-166	F	3	1.5	3	.5	700	N	500	L	N	15	70	10
N-167	F	5	1.5	2	.5	700	N	700	1.5	N	20	70	15
N-168	F	3	1.5	2	.7	700	N	500	1	N	20	100	15
N-169	D	3	2	3	.3	700	N	700	1	N	20	300	10
N-170	D	2	1	1.5	.2	500	N	500	L	N	10	50	7
N-171	D	3	1	2	.2	500	N	500	L	N	15	70	15
N-172	D	3	1	1	.3	700	N	500	1	N	15	50	15
N-173	D	5	1.5	1	.5	700	N	700	1.5	N	20	70	10
N-174	D	3	1.5	1.5	.3	700	N	500	1	N	15	30	15
N-175	D	3	1.5	1.5	.3	700	N	500	1	N	15	70	10

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
	Active stream sediment samples--Continued												
N-121	20	N	L	50	15	N	300	70	15	N	70		8
N-122	L	N	10	50	15	N	300	70	15	N	100		5
N-123	50	N	L	15	15	N	300	30	15	N	70		5
N-124	50	N	L	10	15	N	300	30	20	N	100		3
N-125	100	N	L	70	15	N	200	100	20	N	30		3
N-126	70	N	L	30	10	N	300	70	15	N	70		1
N-127	150	N	L	15	15	N	200	70	150	N	200		5
N-128	70	N	15	15	10	N	300	50	30	N	700		8
N-129	150	N	L	20	15	N	300	70	30	N	150		1
N-130	150	N	20	30	10	N	300	70	150	N	300		3
N-131	50	N	10	20	15	N	300	50	30	N	150		3
N-132	30	N	L	20	10	N	300	30	10	N	150		1
N-133	30	N	L	10	15	N	150	30	15	N	100		3
N-134	150	N	L	15	15	N	200	70	20	N	150		3
N-135	L	N	L	15	15	N	150	50	15	N	100		1
N-136	30	N	L	7	15	N	300	30	15	N	300		5
N-137	L	N	L	15	15	N	200	50	15	N	70		5
N-138	L	N	L	10	15	N	300	30	10	N	200		1
N-139	20	N	L	10	15	N	200	30	15	N	150		3
N-140	100	N	L	15	15	N	200	50	20	N	200		5
N-141	30	N	10	30	15	N	200	30	30	N	150		13
N-142	70	N	10	20	15	N	200	50	30	N	150		3
N-143	100	N	15	10	15	N	500	50	30	N	500		1
N-144	30	N	L	7	15	N	200	30	10	N	150		3
N-145	300	N	L	20	15	N	300	70	30	N	300		1
N-146	70	N	L	10	15	N	300	50	100	N	500		1
N-147	30	N	L	50	10	N	150	50	20	N	100		5
N-148	200	N	10	10	15	N	300	30	30	N	300		3
N-149	50	N	L	15	15	N	200	30	15	N	200		1
N-150	20	N	15	L	15	N	300	30	20	N	300		3
N-151	N	N	10	5	30	L	L	30	G(200)	N	300		1
N-152	L	N	L	15	50	N	200	50	15	L	150		3
N-153	L	N	L	10	30	N	200	30	15	N	300		5
N-154	70	N	L	15	15	N	200	50	20	N	200		3
N-155	20	N	L	15	15	N	200	30	15	N	100		18
N-156	70	N	10	5	15	N	150	30	30	N	700		8
N-157	70	N	15	30	15	N	300	70	15	N	300		3
N-158	100	N	15	5	15	N	300	50	20	N	300		5
N-159	150	N	15	20	15	N	300	50	20	N	200		5
N-160	100	N	L	20	15	N	300	50	15	N	150		3
N-161	30	N	15	15	L	N	300	30	15	N	200		3
N-162	150	N	15	15	15	N	300	70	30	N	200		3
N-163	70	N	L	15	10	N	300	30	15	N	150		5
N-164	30	N	L	20	15	N	300	70	20	N	150		5
N-165	50	N	L	15	15	N	300	50	15	N	200		5
N-166	30	N	15	15	10	N	300	50	15	N	150		3
N-167	150	N	10	20	15	N	200	70	30	N	300		3
N-168	200	N	15	15	15	N	200	70	30	N	700		3
N-169	50	N	L	20	15	N	300	70	20	N	70		3
N-170	30	N	L	15	10	N	200	30	15	N	150		3
N-171	30	N	L	20	15	N	300	50	10	N	50		3
N-172	150	N	15	7	10	N	200	20	30	N	150		3
N-173	70	N	15	7	15	N	200	30	15	N	700		5
N-174	100	N	L	5	10	N	300	50	20	N	200		5
N-175	30	N	L	L	10	N	300	30	15	N	300		3

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

		Semiquantitative spectrographic analyses											
		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
				Active stream sediment samples--Continued									
N-176	D	2	1.5	1.5	.3	500	N	700	1.5	N	15	50	7
N-177	D	2	1.5	1.5	.3	700	N	300	1	N	15	100	15
N-178	D	3	2	1.5	.3	700	N	500	1	N	20	100	15
N-179	D	3	2	2	.3	700	N	500	1	N	20	100	15
N-180	D	2	1.5	1.5	.3	500	N	500	1.5	N	15	70	10
N-181	D	.2	.1	.2	.05	150	N	100	L	N	L	15	7
N-182	D	1.5	.7	1	.1	700	N	150	1	N	7	70	10
N-183	D	2	1	1	.2	700	N	700	1.5	N	10	70	15
N-184	D	1.5	.7	1	.2	700	N	500	1.5	N	10	50	15
N-185	D	3	1.5	1.5	.3	700	N	500	1	N	15	150	15
N-186	D	2	1.5	1.5	.2	700	N	500	1	N	15	150	15
N-187	D	2	1.5	1.5	.3	700	N	500	1	N	15	70	10
N-188	D	2	1	1.5	.3	500	N	500	1	N	15	70	15
N-189	D	2	.7	.7	.3	500	N	300	1	N	10	30	10
N-190	D	3	1.5	1	.3	500	N	300	1.5	N	15	70	10
N-191	D	2	1	1	.2	1,000	N	500	1.5	N	15	30	10
N-192	D	1.5	.7	1	.2	500	N	300	1	N	7	30	15
N-193	D	2	.7	.7	.2	500	N	500	1	N	15	30	15
N-194	D	.7	.3	.7	.1	300	N	150	L	N	5	10	7
N-195	D	3	3	1.5	.3	700	N	500	1	N	15	300	15
N-196	D	2	.7	.7	.2	200	N	500	3	N	10	20	20
N-197	D	1.5	.7	.7	.2	300	N	500	1.5	N	5	15	15
N-198	D	1.5	.7	1	.2	300	N	700	2	N	7	15	10
N-199	D	2	1.5	1.5	.3	500	N	300	1	N	15	150	15
N-200	D	.3	.15	.5	.1	100	N	150	1	N	L	7	7
N-201	D	3	2	2	.3	700	N	700	1	N	15	70	10
N-202	D	3	1.5	1	.3	700	N	500	1	N	15	50	20
N-203	D	3	1	1	.3	700	N	300	1	N	10	50	10
N-204	B	5	1	1	.5	1,000	N	300	1.5	N	10	30	15
N-205	B	3	.3	.7	.3	700	N	300	3	N	5	7	5
N-206	B	3	1.5	2	.5	700	N	500	1	N	15	100	15
N-207	B	3	.5	.7	.2	700	N	150	2	N	5	15	15
N-208	B	2	.3	.7	.2	700	N	500	3	N	L	L	10
N-209	B	3	.5	.7	.3	1,000	N	300	3	N	5	10	10
N-210	B	3	1	1	.3	1,000	N	700	1.5	N	15	70	15
N-211	B	3	1	2	.3	700	N	700	1.5	N	15	70	15
N-212	B	3	1.5	1.5	.3	500	N	700	1	N	15	100	15
N-213	B	3	1	1	.3	700	N	700	1	N	10	50	15
N-214	B	3	1	1.5	.3	700	N	700	1	N	10	70	15
N-215	B	5	1	1.5	.5	1,000	N	700	2	N	10	70	10
N-216	B	3	1	1	.3	700	N	500	1	N	7	100	15
N-217	B	5	2	2	.3	1,000	N	700	L	N	15	200	15
N-218	B	2	.7	1.5	.3	500	N	500	1	N	10	70	10
N-219	B	3	1.5	2	.3	700	N	300	1.5	N	20	200	15
N-220	B	2	.7	1	.3	500	N	500	1.5	N	10	50	10
N-221	D	3	1.5	3	.5	700	N	300	1	N	15	100	15
N-222	D	3	.7	2	.3	700	N	500	1	N	10	30	15
N-223	D	3	.7	1.5	.5	700	N	300	1	N	15	70	15
N-224	D	2	.7	1	.2	700	.5	500	2	N	10	50	15
N-225	D	5	1	2	.7	1,000	N	500	1	N	20	150	15
N-226	D	3	1	2	.5	700	L	500	1	N	15	70	15
N-227	D	2	.7	1.5	.3	500	N	300	1.5	N	15	70	15
N-228	D	3	1	2	.3	1,000	N	700	1.5	N	15	70	15
N-229	C	3	1	1.5	.3	700	N	500	1	N	15	70	15
N-230	C	3	1	1.5	.7	1,000	N	500	1	N	15	70	20

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
	Active stream sediment samples--Continued												
N-176	L	N	L	5	10	N	300	30	15	N	150		3
N-177	20	N	L	20	10	N	300	50	15	N	150		3
N-178	20	N	L	15	15	N	300	50	15	N	200		1
N-179	30	N	10	20	10	N	300	50	15	N	150		3
N-180	30	N	L	15	15	N	300	50	15	N	150		9
N-181	N	N	N	L	15	N	N	15	10	N	20		5
N-182	L	N	N	7	15	N	150	30	15	N	100		5
N-183	70	N	L	20	15	N	300	50	15	N	150		3
N-184	30	N	L	15	15	N	200	30	15	N	150		8
N-185	30	N	L	30	15	N	300	70	15	N	100		3
N-186	30	N	L	30	15	N	300	50	15	N	100		5
N-187	50	N	L	15	10	N	300	50	20	N	150		5
N-188	20	N	L	15	15	N	300	50	20	N	100		8
N-189	20	N	L	10	15	N	100	50	10	N	200		3
N-190	20	N	L	10	15	N	150	50	15	N	200		3
N-191	20	N	L	7	15	N	200	50	15	N	200		3
N-192	L	N	L	10	15	N	200	30	10	N	100		3
N-193	L	N	L	15	15	N	150	50	10	N	150		3
N-194	L	N	L	L	10	N	100	30	10	N	50		3
N-195	20	N	L	70	10	N	300	50	10	N	150		1
N-196	L	N	L	10	15	N	200	70	10	N	150		3
N-197	L	N	L	5	15	N	200	30	15	N	150		3
N-198	70	N	L	5	15	N	300	30	15	N	150		5
N-199	L	N	L	30	15	N	300	50	15	N	150		5
N-200	N	N	N	L	10	N	N	20	L	N	30		5
N-201	150	N	L	15	15	N	300	70	20	N	100		1
N-202	50	N	L	15	15	N	300	50	15	N	200		1
N-203	20	N	L	15	10	N	300	70	10	N	200		3
N-204	300	N	30	L	15	N	100	20	30	N	700		3
N-205	200	N	20	L	10	N	L	15	50	N	700		9
N-206	100	N	10	20	15	N	300	70	30	N	200		5
N-207	300	N	30	L	15	10	L	10	30	N	200		15
N-208	300	N	30	N	10	N	100	L	30	N	300		8
N-209	500	N	50	N	10	N	100	15	70	N	500		8
N-210	70	N	15	7	10	N	200	50	20	N	200		8
N-211	150	N	15	7	10	N	300	50	30	N	200		8
N-212	100	N	10	20	10	N	300	70	20	N	200		8
N-213	200	N	20	5	15	N	200	30	30	N	300		1
N-214	70	N	20	N	15	N	200	15	30	N	300		1
N-215	150	N	30	L	10	N	200	20	30	N	1,000		1
N-216	300	N	15	L	15	N	150	20	30	N	200		1
N-217	L	N	L	20	15	N	300	70	10	N	150		3
N-218	70	N	15	5	10	N	150	30	15	N	150		1
N-219	50	N	L	20	10	N	300	50	15	N	200		1
N-220	100	N	20	7	15	N	200	30	20	N	300		1
N-221	20	N	10	L	10	N	300	30	15	N	700		3
N-222	L	N	L	L	10	N	300	30	15	N	200		3
N-223	L	N	10	7	15	N	200	50	20	N	500		5
N-224	30	N	L	10	15	N	200	30	15	L	50		70
N-225	N	N	20	L	15	N	300	50	20	N	500		1
N-226	100	N	10	5	15	N	300	50	20	N	300		1
N-227	50	N	L	7	10	N	200	50	15	N	300		1
N-228	70	N	15	L	20	N	300	50	15	N	500		24
N-229	20	N	10	10	15	N	300	50	15	N	150		1
N-230	30	N	20	15	15	N	300	50	30	N	300		1

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Active stream sediment samples--Continued							
N-231	C	1.5	1	1.5	.3	500	N	300	1	N	10	70	7
N-232	C	2	1.5	2	.3	700	N	500	1	N	15	70	15
N-233	C	2	1	1.5	.2	700	N	300	1	N	15	70	10
N-234	C	3	1	1.5	.2	700	N	300	1	N	15	70	15
N-235	C	3	1	2	.7	700	N	500	1	N	15	70	15
N-236	C	3	.7	1.5	.5	500	N	500	1	N	10	70	15
N-237	C	2	.7	1.5	.2	500	N	500	1	N	10	70	7
N-240	B	3	1	1.5	.3	500	N	300	1	N	15	100	15
N-241	B	2	.7	1.5	.3	500	N	500	1.5	N	10	50	15
N-242	B	3	.7	1.5	.3	1,000	N	500	1	N	15	30	15
N-243	B	2	1	1.5	.3	700	N	500	1	N	15	70	15
N-245	B	3	.7	1.5	.3	500	N	500	1	N	15	70	15
N-249	E	3	.7	1.5	.2	500	N	500	L	N	15	70	15
N-250	E	3	1	1.5	.3	700	N	500	L	N	20	70	15
N-251	E	3	1.5	1.5	.3	700	N	700	1	N	20	70	15
N-252	E	3	2	2	.3	700	N	300	L	N	20	150	15
N-259	B	3	.7	1	.3	500	N	500	2	N	10	30	20
N-260	B	1.5	.5	.7	.2	200	N	300	3	N	7	5	10
N-261	B	2	.5	.7	.2	300	L	300	3	N	7	15	15
N-262	B	1	.3	.7	.15	300	N	200	3	N	5	15	20
N-263	B	1.5	.3	.7	.3	200	N	500	1	N	5	30	7
N-264	B	1	.2	.7	.1	300	N	100	2	N	L	L	7
N-265	B	3	.2	1	.15	1,000	N	150	5	N	7	5	10
N-266	B	.7	.2	.3	.07	150	N	200	3	N	L	7	7
N-268	B	1	.3	.7	.3	300	N	300	15	N	5	20	10
N-269	B	1	.5	.7	.2	500	N	200	7	N	5	15	15
N-270	B	1.5	.5	1	.2	500	N	200	7	N	5	70	10
N-271	B	2	1	1	.2	700	N	300	3	N	10	150	10
N-272	B	3	1	1.5	.3	700	N	300	3	N	15	150	15
N-273	B	3	1	1.5	.3	700	N	500	2	N	15	70	15
N-274	B	3	3	2	.3	700	N	500	1	N	20	500	15
N-275	E	2	.7	1	.2	700	N	500	2	N	7	50	15
N-276	E	2	.7	1.5	.2	700	N	500	1.5	N	10	100	15
N-277	E	1.5	.7	1.5	.2	500	N	300	1.5	N	7	70	15
N-278	E	2	.7	1	.2	500	N	500	1	N	10	70	15
N-279	E	2	.7	1	.15	700	N	500	1	N	10	70	15
N-280	E	2	1	1	.2	700	N	300	2	N	10	150	10
N-281	E	1.5	.5	.7	.2	500	L	300	2	N	5	50	15
N-282	E	1.5	.3	.7	.15	500	.5	150	3	N	L	30	15
N-283	E	2	.7	2	.15	700	N	500	1	N	10	70	15
N-284	E	3	.7	1.5	.3	700	N	300	1	N	10	70	15
N-285	E	3	1	2	.3	700	N	500	1.5	N	15	70	15
N-286	B	3	1	1.5	.3	700	N	700	2	N	15	70	15
N-287	B	1	.5	1.5	.2	300	N	500	1	N	7	20	7
N-288	B	2	.5	1.5	.3	300	N	300	2	N	10	30	15
N-289	B	2	1	1.5	.3	500	N	700	1	N	15	100	30
N-290	B	2	.7	1.5	.3	500	N	500	1	N	15	70	15
N-291	B	3	1.5	1.5	.3	700	N	500	1	N	15	200	15
N-292	B	3	1.5	1.5	.3	500	N	500	1	N	20	150	15
N-293	B	1.5	.5	1	.15	500	N	500	1	N	5	20	5
N-294	B	1.5	.7	1	.2	700	N	500	1	N	7	70	10
N-295	B	1.5	.5	1	.15	300	N	300	1	N	7	20	10
N-296	B	2	.7	1	.2	700	N	500	2	N	10	30	15
N-297	B	2	.7	.7	.2	700	N	300	1	N	15	50	15
N-298	B	2	1	1.5	.3	700	N	300	1.5	N	15	100	15

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
					Active stream sediment samples--Continued								
N-231	20	N	L	15	10	N	300	50	15	N	70		1
N-232	50	N	10	15	15	N	500	50	20	N	100		1
N-233	L	N	L	20	15	N	500	50	10	N	70		1
N-234	30	N	L	30	15	N	300	70	15	N	100		1
N-235	20	L	L	20	15	N	500	70	15	N	150		1
N-236	30	N	L	15	15	N	300	50	10	N	300		1
N-237	20	N	L	7	15	N	300	50	10	N	100		1
N-240	20	N	L	20	10	N	300	50	15	N	100		1
N-241	20	N	L	20	10	N	300	30	15	N	150		1
N-242	30	N	L	7	15	N	300	50	10	N	70		13
N-243	50	N	L	15	15	N	500	50	10	N	100		1
N-245	50	N	L	20	30	L	300	50	20	N	100		3
N-249	L	N	L	20	15	N	300	50	20	N	100		3
N-250	150	N	L	30	20	N	300	70	30	N	100		7
N-251	70	N	L	30	15	N	300	70	15	N	70		1
N-252	L	N	L	100	15	N	300	70	15	N	70		7
N-259	100	N	10	7	15	N	200	30	50	N	500		3
N-260	100	N	L	5	15	N	150	15	20	N	100		7
N-261	70	N	15	5	50	N	150	20	30	N	700		3
N-262	100	N	10	5	20	L	150	10	15	N	100		9
N-263	70	N	L	5	15	N	150	30	50	N	500		1
N-264	150	N	15	L	15	N	N	L	50	N	150		5
N-265	1,000	N	30	L	15	N	100	L	70	N	300		24
N-266	L	N	L	L	15	N	L	L	10	N	30		9
N-268	50	N	10	L	10	N	100	30	30	N	100		15
N-269	150	N	10	5	15	L	100	20	30	N	150		9
N-270	500	N	30	5	15	L	L	20	50	N	150		24
N-271	L	N	10	15	15	N	100	30	15	N	200		7
N-272	100	N	15	10	15	N	200	70	30	N	500		7
N-273	50	N	L	15	15	N	300	50	15	N	100		1
N-274	L	N	L	70	15	N	300	70	15	N	200		3
N-275	50	N	L	7	15	N	300	30	15	N	300		1
N-276	300	N	L	50	15	N	300	50	50	N	100		7
N-277	30	N	L	20	15	N	300	50	200	N	70		7
N-278	70	N	L	15	10	N	300	70	15	N	70		3
N-279	30	N	L	20	15	N	300	50	15	N	100		9
N-280	150	N	L	7	15	N	300	70	20	N	500		7
N-281	N	N	L	10	15	N	200	50	15	N	70		7
N-282	N	N	L	5	15	N	200	50	30	N	150		7
N-283	150	N	L	10	10	N	300	30	30	N	150		3
N-284	150	N	L	10	10	N	300	50	100	N	300		7
N-285	70	N	L	20	15	N	300	50	15	N	300		1
N-286	30	N	L	15	15	N	300	70	15	N	100		1
N-287	30	N	N	7	15	N	300	20	15	N	100		5
N-288	L	N	L	10	15	N	300	30	15	N	200		1
N-289	20	N	L	20	15	N	300	70	10	N	150		7
N-290	30	N	L	15	15	N	300	50	15	N	150		1
N-291	L	N	L	20	15	N	300	50	15	N	100		5
N-292	L	N	10	20	15	N	300	50	15	N	100		1
N-293	N	N	L	10	15	N	300	20	10	N	100		1
N-294	N	N	L	20	15	N	300	20	10	N	200		3
N-295	N	N	L	7	15	N	300	30	10	N	100		3
N-296	20	N	L	10	15	N	300	50	15	N	150		1
N-297	L	N	L	15	15	N	300	50	10	N	100		1
N-298	L	N	L	15	10	N	300	50	15	N	150		

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
					Active stream sediment samples--Continued								
N-299	B	2	1	1.5	.3	700	N	500	1	N	15	70	15
N-300	B	3	2	2	.3	700	N	500	1	N	20	300	10
N-301	B	2	.7	1	.2	300	N	300	L	N	15	70	15
N-302	B	3	.7	1.5	.3	700	N	500	1	N	10	100	10
N-303	B	2	.7	1.5	.2	200	N	700	1	N	7	70	10
N-306	G	1.5	.5	.7	.2	150	N	500	1.5	N	7	20	15
N-308	G	2	.3	.7	.15	300	N	700	1	N	7	20	100
N-309	G	2	.3	.7	.3	150	N	500	1.5	N	5	30	20
N-312	G	3	.7	1	.3	500	L	500	2	N	10	70	30
N-314	B	3	.7	1	.3	500	N	500	3	N	10	70	50
N-315	B	3	.7	1.5	.3	500	N	700	1	N	15	100	20
N-316	B	3	1	2	.3	500	N	700	1.5	N	15	150	15
N-317	B	3	1.5	2	.5	700	N	500	1.5	N	15	150	10
N-318	B	3	1.5	2	.3	500	N	700	1	N	15	150	10
N-319	B	3	1.5	2	.3	700	N	700	1	N	20	150	15
N-320	B	1.5	.7	.7	.2	500	N	500	2	N	7	70	15
N-321	B	1.5	.7	.7	.2	500	N	500	2	N	7	70	15
N-322	B	3	1	1.5	.5	700	N	700	1.5	N	15	150	50
N-323	B	2	.7	1	.3	700	N	300	3	N	10	50	10
N-324	B	3	.7	1.5	.3	500	L	500	2	N	15	70	15
N-325	B	3	1	2	.3	500	N	700	1	N	15	150	10
N-328	F	2	.2	.7	.2	200	L	500	2	N	5	20	15
N-332	C	3	1	2	.2	500	N	500	1	N	15	100	15
N-549	D	1.5	.7	1.5	.2	700	N	300	1	N	15	150	15
N-550	D	1	.3	.7	.2	300	N	100	L	N	7	50	10
N-551	D	3	1.5	1.5	.7	500	N	500	L	N	30	150	15
N-552	D	2	1	1.5	.5	700	N	200	L	N	15	150	15

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Sample	Semiquantitative spectrographic analyses (ppm)											Chemical analyses (ppm)	
	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	CxCu	CxHM
						Active stream sediment samples--Continued							
N-299	30	N	L	15	15	N	300	50	20	N	150		5
N-300	L	N	L	20	10	N	300	50	10	N	100		9
N-301	20	N	L	15	10	N	200	30	15	N	150		1
N-302	20	N	L	20	15	N	300	30	15	N	200		1
N-303	50	N	L	10	15	N	300	20	10	N	200		
N-306	L	N	L	5	10	N	100	15	20	N	150		
N-308	30	N	L	5	10	N	100	30	15	N	100		
N-309	30	N	L	7	15	N	300	50	30	N	150		
N-312	50	N	10	15	15	N	200	70	70	N	200		
N-314	150	N	30	L	20	N	200	30	30	N	500		
N-315	100	N	10	5	15	N	500	30	20	N	300		
N-316	100	N	10	15	20	N	300	50	20	N	150		
N-317	150	N	15	15	15	N	300	30	30	N	300		
N-318	100	N	L	15	15	N	300	50	15	N	200		
N-319	100	N	10	15	15	N	500	70	15	N	70		
N-320	50	N	15	5	15	N	150	30	20	N	200		
N-321	50	N	15	L	20	N	150	30	20	N	300		
N-322	100	N	15	10	15	N	300	70	30	N	500		
N-323	50	N	10	7	15	N	200	50	30	N	200		
N-324	50	N	10	15	15	N	300	50	30	N	150		
N-325	70	N	L	10	10	N	300	30	20	N	150		
N-328	150	N	20	L	15	N	100	15	30	N	700		
N-332	20	N	L	30	L	N	500	70	15	N	150		
N-549	150	N	L	100	15	N	300	70	20	N	70	20	3
N-550	L	N	L	20	10	N	100	50	15	N	150	16	0
N-551	150	N	10	70	20	N	300	70	30	N	150	12	0
N-552	50	N	L	70	20	N	300	70	20	N	100	12	0

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Panned concentrates							
M- 67	G	20	.2	.5	G(1)	700	N	100	1	N	20	500	10
M-295	B	15	.7	1	G(1)	1,500	N	200	1	N	15	70	20
M-296	B	7	1.5	1.5	1	1,000	N	500	1	N	10	100	15
M-297	B	15	.5	1	G(1)	2,000	N	200	2	N	15	70	20
M-299	B	15	.7	1	G(1)	2,000	N	100	2	N	20	150	20
M-300	B	20	.3	.3	G(1)	1,500	2	L	1.5	30	200	700	300
M-301	D	5	3	3	.7	1,000	N	500	L	N	20	1,000	15
M-302	D	10	1.5	1	1	1,500	N	200	1	N	20	150	15
M-303	D	5	1.5	1.5	G(1)	1,000	N	300	1	N	15	1,000	20
M-304	D	10	1	1.5	G(1)	1,500	N	150	1	N	70	700	300
M-305	D	3	1.5	2	1	1,000	N	300	L	N	20	700	15
M-306	E	3	.7	1.5	.7	1,000	N	300	L	N	15	100	30
M-307	E	5	.7	1.5	1	1,500	N	300	1	N	15	100	30
M-308	E	5	.3	.05	.3	50	N	1,500	1	N	L	50	150
M-311	G	10	.7	2	1	1,000	N	100	1	N	15	200	10
M-312	G	10	1	1.5	G(1)	700	N	300	1	N	20	300	10
M-313	E	10	.7	1.5	G(1)	700	N	200	1	15	50	200	10
M-314	G	15	.3	1	G(1)	700	N	150	1	N	30	300	15
M-315	F	10	.7	2	G(1)	1,000	N	150	1	N	30	150	15
M-316	F	7	1	2	G(1)	1,000	N	300	1	N	15	150	15
N-305	G	20	.3	1	G(1)	1,500	N	100	1.5	N	20	300	7
N-307	G	7	.3	1.5	1	500	N	200	L	N	15	70	20
						Vein material							
M- 90	F	L	L	N	L	L	N	N	L	N	N	N	5
M- 94	E	.5	.03	L	.005	70	N	L	L	N	N	N	10
M- 95	E	.2	L	L	.007	15	N	L	L	N	N	N	5
M-253	D	.15	.05	.7	.03	15	N	700	L	N	N	N	5
M-254	D	1.5	.03	.05	.02	10	.5	150	L	N	5	N	70
M-258	C	.3	.05	.5	.15	100	N	100	L	N	L	10	5
M-277	G	.1	L	.05	.007	15	N	70	L	N	N	10	15
M-309	E	1	.3	.3	.15	150	N	3,000	L	N	L	10	20
M-321	E	.15	L	G(20)	.003	N	N	N	7	N	N	N	N
M-322	E	.15	L	G(20)	.002	N	N	N	5	N	N	N	N
M-323	E	.7	.3	3	.07	150	N	70	L	N	L	30	15
M-324	F	7	5	5	.2	700	N	200	N	N	70	1,500	15
M-563 1/	E	.5	.2	.05	.05	50	N	100	L	N	L	L	L
M-614	B	3	.05	.05	.5	200	N	300	L	N	5	100	15
M-615	B	.2	L	.05	.2	30	N	150	L	N	N	70	20

1/ Sample contained 2,000 ppm As.

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Semiquantitative spectrographic analyses

Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)
						(ppm)					
					Panned concentrates						
M- 67	700	N	20	7	L	N	N	200	G(200)	N	G(1,000)
M-295	1,000	N	100	L	10	10	N	70	200	N	700
M-296	700	N	20	7	10	N	300	70	70	N	700
M-297	1,000	N	70	5	10	50	L	70	100	N	G(1,000)
M-299	1,000	N	50	5	15	70	N	70	100	N	G(1,000)
M-300	700	N	20	7	10	N	N	100	150	N	G(1,000)
M-301	50	N	L	15	L	N	300	70	20	N	700
M-302	700	N	30	7	10	N	100	50	100	N	1,000
M-303	300	N	15	5	L	N	200	50	50	N	1,000
M-304	500	N	20	5	15	N	N	100	G(200)	N	G(1,000)
M-305	300	N	15	7	L	N	150	30	70	N	500
M-306	150	N	L	15	L	N	300	50	70	N	200
M-307	700	N	L	7	L	N	150	50	200	N	G(1,000)
M-308	N	N	30	L	30	N	150	30	70	N	300
M-311	700	N	15	7	L	15	N	100	G(200)	N	1,000
M-312	500	N	15	7	10	N	L	150	200	N	G(1,000)
M-313	700	N	150	7	L	N	L	100	100	N	G(1,000)
M-314	700	N	20	7	L	N	N	150	G(200)	N	G(1,000)
M-315	300	N	70	5	L	N	200	100	70	N	1,000
M-316	500	N	20	7	L	N	300	100	150	N	700
N-305	G(1,000)	N	50	5	10	30	N	100	G(200)	N	G(1,000)
N-307	300	N	20	5	L	N	N	150	G(200)	N	G(1,000)
					Vein material						
M- 90	N	N	N	L	N	N	N	L	N	N	N
M- 94	N	N	N	5	N	N	N	L	N	N	N
M- 95	N	N	N	5	N	N	N	L	L	N	N
M-253	N	N	N	N	L	N	100	L	N	N	L
M-254	N	N	N	5	N	N	N	L	N	N	N
M-258	N	N	L	5	L	N	N	L	N	N	N
M-277	N	N	N	L	N	N	N	L	N	N	L
M-309	50	N	L	5	20	N	500	10	10	N	70
M-321	N	N	N	N	N	N	200	L	30	N	N
M-322	N	N	N	N	N	N	200	L	50	N	N
M-323	N	N	N	5	L	N	L	30	10	L	30
M-324	N	N	L	150	N	N	150	300	10	N	50
M-563	L	L	L	5	L	N	50	20	L	N	70
M-614	50	N	10	15	15	N	700	70	20	N	150
M-615	20	N	L	7	10	N	300	50	20	N	100

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Altered rock							
M- 22	F	5	2	2	1	700	N	1,000	L	N	20	10	150
M- 92	F	1	.1	.5	.15	150	N	300	1	N	N	N	10
M- 93	E	1	.3	.7	.1	300	N	500	1	N	N	N	10
M-170	G	3	.7	1.5	.2	300	N	200	1.5	N	5	20	70
M-198	B	7	3	5	1	700	N	1,500	L	N	50	300	20
M-251	B	3	.7	1	.2	200	N	700	L	N	5	30	20
M-252	D	3	1.5	1.5	.5	200	N	1,000	L	N	10	70	50
M-257	D	5	1	1.5	.3	200	N	700	L	N	7	50	70
M-259	D	2	3	1.5	.2	500	L	200	L	N	30	100	100
M-260	D	2	.3	.7	.2	300	N	700	1	N	5	5	15
M-287	G	3	.7	1.5	.3	300	N	700	1	N	5	30	30
M-288	G	3	.7	1	.2	300	N	1,500	L	N	5	50	50
M-294	B	1.5	.3	.7	.2	300	N	700	1	N	L	L	10
M-298	B	1.5	.3	1	.1	150	N	150	1.5	N	7	15	70
M-310	E	5	2	2	.3	1,000	N	1,000	N	N	70	3	20
M-317 1/	E	7	2	7	.1	3,000	15	70	1	L	15	30	15,000
M-318 2/	E	7	2	1.5	.15	1,500	30	70	L	L	30	20	5,000
M-319	E	5	2	5	.15	1,000	7	150	1.5	N	10	15	3,000
M-320	E	3	2	7	.3	300	N	150	1	N	10	15	20
M-552	G	5	.3	.2	.5	200	N	1,000	1	N	10	30	10
M-555	E	5	.3	.15	.3	300	N	300	1	N	10	70	7
M-559	E	7	3	1	.7	500	N	700	L	N	30	300	L
M-571	A	7	.5	2	1	500	N	700	L	N	20	70	10
M-608	E	2	.7	2	.2	300	N	500	L	N	7	50	20
N-116	E	.7	.2	.7	.1	150	N	1,000	L	N	N	7	15
N-238	C	5	2	3	.5	700	N	700	L	N	30	70	20
N-239 3/	C	.5	.1	.1	.03	15	N	200	L	N	N	L	15
N-258 4/	E	5	2	5	.1	2,000	30	150	2	30	15	10	20,000
N-310	G	3	1	1	.3	500	N	700	1	N	15	70	70
N-311	G	7	1.5	2	.5	700	N	200	1	N	20	L	70
N-313	G	3	1	2	.3	700	N	500	1	N	15	100	70
N-326	E	5	.5	.5	.07	700	30	700	1.5	15	20	15	7,000

1/ Sample contained 100 ppm Cd.
2/ Sample contained 20 ppm Cd.
3/ Sample contained 1,000 ppm As.
4/ Sample contained 100 ppm Cd.

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Semiquantitative spectrographic analyses

Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	/Zn (200)	Zr (10)	Description
						(ppm)						
						Altered rock						
M- 22	N	N	10	20	10	N	700	100	20	N	15	Fe-stained gneiss
M- 92	30	N	10	L	20	N	L	L	15	N	100	Fe-stained dike
M- 93	50	N	L	L	20	L	L	L	20	N	70	Bleached quartz porphyry
M-170	L	N	L	L	15	N	300	50	10	N	100	Fe-stained gneiss
M-198	50	N	10	100	10	N	1,000	100	30	N	150	Pyritiferous dike
M-251	20	N	L	5	10	N	300	100	L	N	70	Fe-stained gneiss
M-252	20	N	L	7	10	N	700	50	L	N	200	Fe-stained gneiss
M-257	50	N	L	5	15	N	500	50	L	N	100	Fe-stained gneiss
M-259	N	N	N	100	10	N	300	100	L	N	10	Amphibolitic skarn
M-260	70	N	15	L	15	N	100	L	20	N	300	Bleached dike
M-287	20	N	L	7	10	N	300	50	10	N	100	Sulfide-bearing gneiss
M-288	L	N	L	5	15	N	300	70	L	N	100	Bleached gneiss
M-294	50	N	L	L	20	N	200	L	L	N	100	Fe-stained gneiss
M-298	20	N	L	L	L	N	300	20	L	N	100	Fe-stained gneiss
M-310	30	N	L	150	200	30	300	150	15	700	100	Brecciated gneiss
M-317	20	N	L	7	10	500	200	30	15	G(10,000)	100	Cu-stained skarn
M-318	200	N	L	5	70	150	100	50	20	10,000	150	Cu-stained skarn
M-319	30	N	L	7	30	200	300	50	20	10,000	100	Bleached skarn
M-320	L	N	15	7	L	N	700	20	20	700	20	Bleached skarn
M-552	L	5	10	50	10	N	1,000	100	10	N	200	Fe-stained gouge
M-555	L	L	10	10	20	N	100	150	20	N	200	Fe-stained gneiss
M-559	L	L	10	150	20	N	200	200	20	N	200	Sheared gneiss
M-571	50	L	10	20	L	N	150	150	20	N	300	Fe-stained dike
M-608	150	N	L	15	10	N	500	70	30	N	150	Fe-stained gneiss
N-116	N	N	N	L	15	10	300	15	N	N	150	Fe-stained gneiss
N-238	50	N	10	15	10	N	1,000	150	15	N	150	Fe-stained dike
N-239	N	N	L	L	L	N	N	L	N	N	20	Vuggy bleached rock
N-258 1/	L	7	10	L	20	200	150	20	15	G(10,000)	50	Cu-stained gneiss
N-310	20	N	L	7	15	N	500	50	L	N	150	Chloritized dike
N-311	50	N	20	L	15	N	300	70	15	N	200	Chlor. pyritic gneiss
N-313	200	N	L	20	10	N	300	50	50	N	150	Pyritiferous pegmatite
N-326	L	N	10	L	30	100	L	30	15	G(10,000)	30	Cu-stained skarn

1/ Sample contained 1,000 ppm W.

TABLE 1.—*Analyses of samples from the Salmon River Breaks*

Semiquantitative spectrographic analyses

		(percent)				(ppm)							
Sample	Area	Fe (.05)	Mg (.02)	Ca (.05)	Ti (.002)	Mn (20)	Ag (.5)	Ba (20)	Be (1)	Bi (10)	Co (10)	Cr (5)	Cu (2)
						Unaltered rock							
M- 20	F	3	3	3	.3	500	N	700	L	N	10	50	10
M- 58	G	.7	.2	.7	.1	100	N	1,500	L	N	N	N	7
M- 59	G	3	1.5	.3	.3	500	N	700	L	N	20	70	20
M- 80	F	.5	.03	.3	.03	300	N	100	5	N	N	N	10
M- 89	F	.5	.15	.5	.07	150	N	300	1	N	N	L	7
M- 91	F	7	3	5	.5	1,000	N	200	L	N	50	200	30
M-158	D	2	.7	.5	.3	300	N	200	1	N	10	50	10
M-159	D	2	1	1	.2	200	N	1,500	1	N	10	70	10
M-255	D	1.5	.5	1	.15	300	N	700	30	N	N	5	7
M-256	D	10	5	7	.5	1,000	N	500	L	N	50	700	70
M-350	C	5	.3	L	.5	200	N	300	1	N	L	150	5
M-352	A	1	.1	.5	.05	500	N	1,000	1	N	L	L	L
M-357	A	1.5	.5	.07	.1	100	N	150	L	N	5	20	15
M-362	B	5	.07	.1	.2	700	N	1,000	1	N	5	5	L
M-560	E	2	.3	.7	.2	300	N	700	1	N	L	10	L
M-564	E	15	7	7	1	700	N	300	L	N	100	700	10
M-573	A	2	.3	.5	.2	300	N	1,000	L	N	10	20	L
M-612	B	1.5	.05	.15	.05	150	N	300	1.5	N	N	L	15
N-102	F	.5	.05	.05	.05	150	.5	150	1	N	L	L	15
N-246	B	2	.7	1.5	.15	300	N	500	1	N	7	50	15
N-247	B	1	.3	.7	.1	150	N	700	1	N	L	7	7
N-248	E	3	.7	1.5	.3	500	N	500	L	N	10	50	30
N-253	E	15	2	7	G(1)	1,000	N	200	L	N	30	20	150
N-254	E	.5	.2	.2	.03	100	N	700	1	N	N	10	7
N-255	E	1.5	1	1.5	.3	300	N	700	L	N	5	50	15
N-256	E	1	.3	1	.15	200	N	700	1.5	N	L	7	15
N-257	E	2	.7	1.5	.2	300	N	700	L	N	15	50	15
N-267	B	.7	.1	.3	.07	300	L	150	3	N	N	L	100
N-304	B	2	.5	1.5	.2	200	L	500	L	N	7	L	15
N-327	F	2	.2	.7	.15	300	N	300	1	N	L	5	50
N-329	F	1.5	.03	.1	.07	200	N	300	1.5	N	L	L	50
N-330	F	.7	.03	.3	.07	150	N	70	2	N	N	L	30
N-331	F	1	.07	.5	.05	150	N	200	2	N	N	L	15
N-333	D	5	.5	1	.3	700	N	1,500	2	N	15	20	100
N-548	D	.07	L	.15	.005	70	N	L	N	N	N	N	10

Primitive Area, Idaho and Lemhi Counties, Idaho—Continued

Semiquantitative spectrographic analyses

Sample	La (20)	Mo (2)	Nb (10)	Ni (2)	Pb (10)	Sn (10)	Sr (50)	V (5)	Y (5)	Zn (200)	Zr (10)	Description
	(ppm)											
						Unaltered rock						
M- 20	20	N	N	15	10	N	200	20	15	N	100	Biotite gneiss
M- 58	N	N	N	L	20	N	500	L	L	N	70	Biotite gneiss
M- 59	70	N	10	30	L	N	N	70	30	N	150	Biotite gneiss
M- 80	L	N	10	L	30	10	N	L	30	N	50	Gneiss
M- 89	30	N	L	L	20	N	100	L	10	N	50	Porphyry dike
M- 91	N	N	L	100	L	N	150	200	30	N	100	Amphibolite
M-158	20	N	10	7	L	N	N	30	20	N	700	Orthogneiss
M-159	30	N	L	15	15	N	300	20	15	N	150	Paragneiss
M-255	30	N	N	L	15	N	300	L	L	N	70	Granitized gneiss
M-256	L	N	L	20	L	N	300	150	20	N	70	Gneiss
M-350	L	L	L	10	20	N	100	200	L	N	150	Iron-stained gneiss
M-352	L	L	10	L	30	N	200	10	10	N	50	Muscovite-qtz monzonite
M-357	L	L	L	10	10	N	150	20	L	N	200	Quartzite
M-362	50	L	L	5	20	N	200	20	L	N	200	Iron-stained gneiss
M-560	100	L	10	L	50	N	200	20	20	N	200	Dike
M-564	L	L	10	30	L	N	200	500	50	N	L	Amphibolite
M-573	100	L	L	L	30	N	150	20	10	N	150	Mylonite
M-612	30	N	15	5	15	N	N	L	20	N	100	Rhyolite dike
N-102	20	N	10	L	10	N	N	L	10	N	100	Porphyritic dike
N-246	50	N	L	10	15	N	700	70	20	N	150	Biotite gneiss
N-247	L	N	L	L	15	N	200	10	L	N	100	Granite
N-248	L	N	L	15	15	N	300	70	100	N	200	Biotite gneiss
N-253	30	N	10	L	L	N	700	150	50	N	700	Lamprophyre
N-254	N	N	L	L	15	L	L	L	15	N	20	Quartz porphyry dike
N-255	70	N	L	7	10	N	500	50	20	N	150	Paragneiss
N-256	30	N	L	L	15	N	300	10	15	N	100	Quartz monzonite
N-257	100	N	N	7	10	N	300	50	70	N	70	Paragneiss
N-267	30	N	20	L	15	L	N	L	30	300	200	Quartz monzonite
N-304	30	N	L	10	15	N	300	10	L	N	200	Biotite gneiss
N-327	100	N	20	L	15	N	N	10	15	N	100	Granodiorite
N-329	30	N	15	L	15	N	L	L	15	N	100	Porphyry dike
N-330	70	N	L	L	10	N	N	L	15	N	150	Granodiorite
N-331	70	N	L	L	20	N	L	L	10	N	70	Porphyritic granodiorite
N-333	70	N	70	L	15	N	500	50	70	N	500	Biotite gneiss
N-548	N	N	N	5	N	N	N	L	N	N	N	Migmatite

Studies Related to Wilderness—Primitive Areas, 1971

GEOLOGICAL SURVEY BULLETIN 1353

This volume was published as separate chapters A–C

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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U. S. GOVERNMENT PRINTING OFFICE : 1972 O - 459-642