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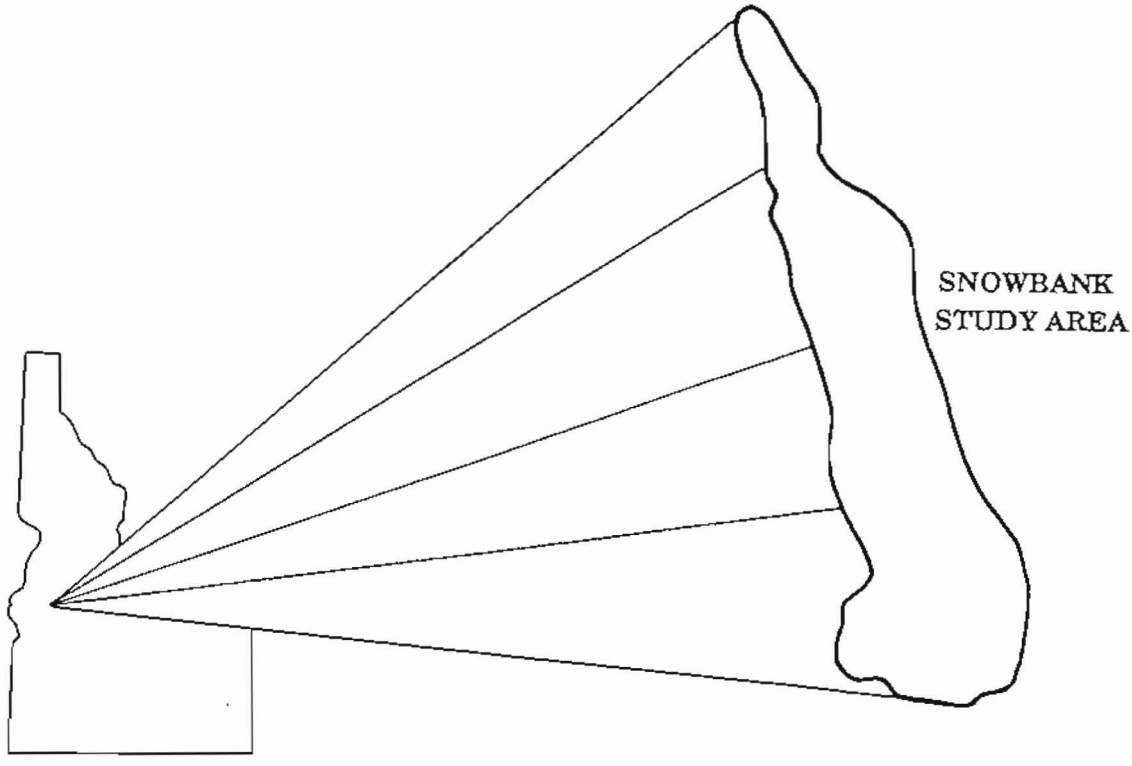
Mineral Resources of the Snowbank Study Area, Valley County, Idaho



BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE SNOWBANK STUDY AREA, VALLEY COUNTY, IDAHO

By
Thomas J. Peters

MLA 2-93

Western Field Operations Center
Spokane, Washington

UNITED STATES DEPARTMENT OF THE INTERIOR
Manuel Lujan, Jr., Secretary

BUREAU OF MINES
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The Snowbank study area, which had been proposed as Wilderness, lies about 5 air mi southwest of Cascade, Idaho, and about 60 air mi north of Boise. The eastern boundary of the north-south-elongate study area lies 1- to 2-mi east of Cascade Reservoir; the western boundary is contiguous, in part, with the western boundary of Valley County. The 8,200-acre study area is underlain by Cretaceous granitoid rocks of the Idaho batholith.

Three prospects were found in or near the study area during a library and field search. Gold occurs at one 30-ft adit, but the gold-bearing structure appeared too narrow to contain resources. Two other prospects appeared essentially unmineralized. No evidence of geothermal activity was observed. Rock in the area is not potentially useful as dimension stone because it does not split into flat slabs. To be used as aggregate, the rock would require crushing and hauling to distant markets. One of 18 alluvium concentrate (placer) samples contained free gold, worth $1.07 per cubic yard of gravel (at a $350 per oz gold price). No alluvial bars were seen; deposits were too small to contain gold resources or be considered gravel resources.

14. SUBJECT TERMS

Free (placer) gold	Volcanic flows	Geothermal	Quartz diorite
Columbia River basalt	Granodiorite	Alluvium	Snowbank Mountain
Lookout Peak	Boise National Forest	Long Valley	Mineral resources

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PREFACE

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Bureau of Mines and U.S. Geological Survey to survey certain areas of Federal lands ". . . to determine the mineral values, if any, that may be present . . ." Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a Bureau of Mines mineral investigation of the Snowbank study area, Valley County, ID, which includes the lands recommended for Wilderness. Mining-related activities in the study area would be severely restricted under wilderness designation.

This open-file report contains data gathered and interpreted by personnel of the U.S. Bureau of Mines, Western Field Operations Center, Branch of Resource Evaluation, East 360 Third Avenue, Spokane, WA 99202. This report has been approved by the Branch of Mineral Land Assessment, Washington, DC.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

yd^3	cubic yard
°C	degree Celsius
°F	degree Fahrenheit
ft	foot
in.	inch
mi	mile
ppb	part per billion
ppm	part per million
oz	troy ounce

SUMMARY

The Snowbank study area lies about 5 air mi (miles) southwest of Cascade, Idaho, and about 60 air mi north of Boise. The eastern boundary of the north-south-elongate study area lies 1 to 2 mi east of Cascade Reservoir; the western boundary is contiguous, in part, with the western boundary of Valley County. The relatively small, 8,200-acre study area is underlain by Cretaceous granitoid rocks of the Idaho batholith.

Three prospects were found in or near the study area during a library and field search. Gold was found at one of the prospects, but the mineralized structure, where observed, appears too narrow to contain resources; however, the other two prospects appear essentially unmineralized. No evidence of geothermal activity was observed. Rock in the area is not potentially useful as dimension stone because it does not split into flat slabs. To be used as aggregate, the rock would require crushing and hauling to distant markets. One of 18 alluvium concentrate (placer) samples contained free gold--$1.07 worth per cubic yard of gravel (at a $350 per oz gold price). No alluvial bars were seen; deposits are too small to contain resources.

INTRODUCTION

This report is part of the USBM (U.S. Bureau of Mines) Idaho Land Assessment Program to study the mineral resources of priority roadless areas in Idaho. The results of mineral inventories on specific study areas, such as Snowbank, provide minerals information needed by the President, the Congress, land management agencies, and ultimately, by the public, to make wise decisions regarding future land management practices. The information also helps fulfil a long-term Bureau of Mines objective, to ensure the nation has an adequate, dependable supply of minerals at a reasonable cost.

Geographic Setting

The Snowbank study area lies about 5 air mi southwest of Cascade, Idaho, and about 60 air mi north of Boise (fig. 1), in the Boise National Forest. The eastern boundary of the north-south-elongate study area lies 1 to 2 miles east of Cascade Reservoir, the western boundary is contiguous, in part, with the western boundary of Valley County. The 8,200-acre study area is reached by Idaho Highway 55, north from Boise, or south from McCall, to Cascade, Idaho. From Cascade, access is by way of Valley County and USFS (U.S. Forest Service) roads (fig. 2).

The study area mainly covers the upper portion of the east-facing slope of a N. 15° W.-trending fault block mountain ridge, along which occurs 8,318-ft Snowbank Mountain and 7,820-ft Lookout Peak. The area is mainly wooded with Douglas and grand fir, lodgepole pine, and Engelmann spruce at lower elevations; whitebark and lodgepole pine and subalpine fir predominate near timberline.

The climate consists of frigid, long, snowy winters and short, dry summers. The climate is similar to that of nearby McCall (fig. 1), although somewhat cooler and wetter because of higher elevation. At McCall, the mean minimum temperature in January is about 6°F, the mean July maximum is about 82°F; the warmest months are June through August, with a normal of about 60°F. Annual precipitation at McCall is over 25 in. (inch) (probably over 40 in. on Snowbank Mountain); the driest months are July and August, about 0.6 in. rain per month; December and January are the wettest, with average precipitation (as snow) of 3.5 and 3.6 in. per month, respectively (National Oceanic and Atmospheric Administration, 1974, p. 647-655).

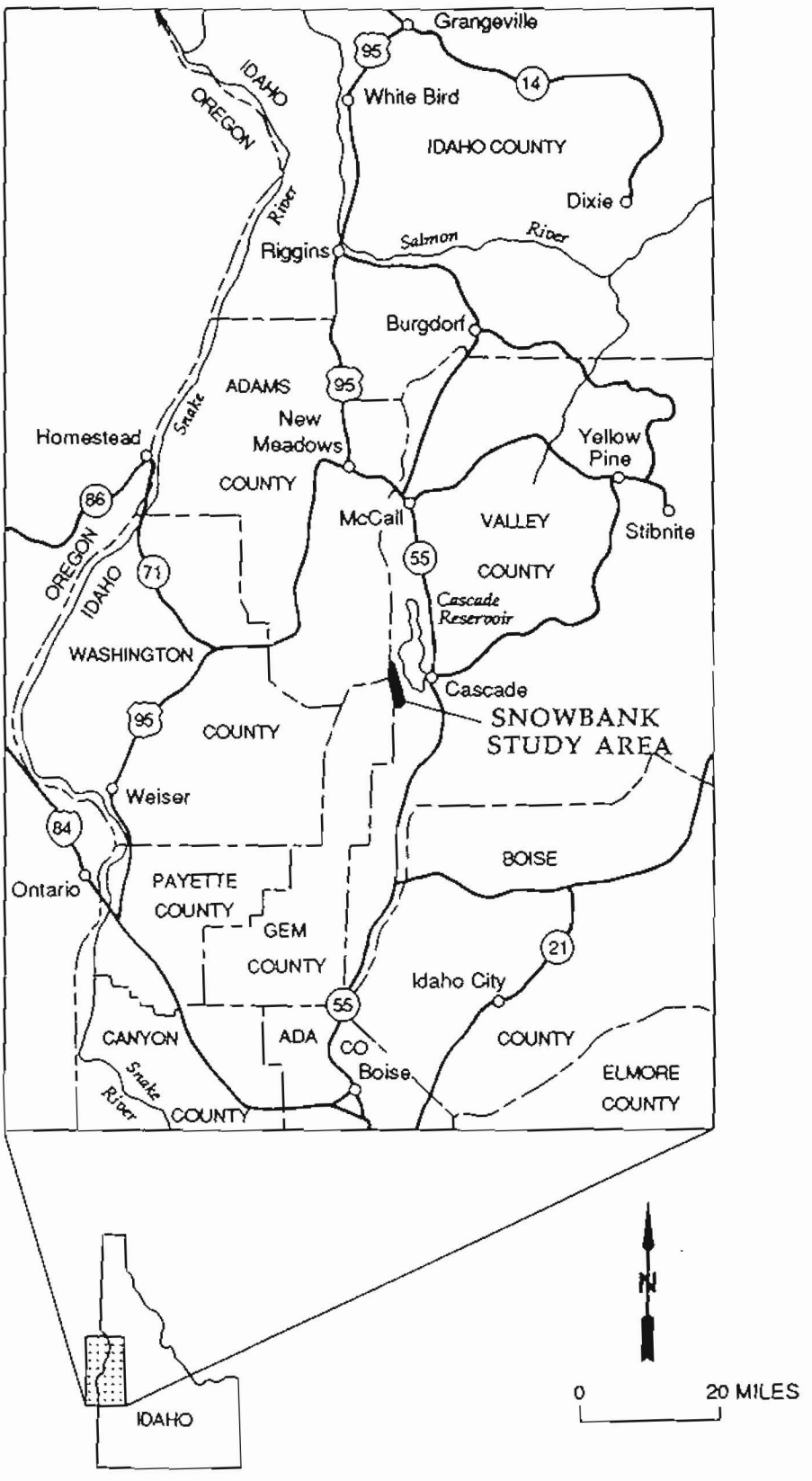


Figure 1.- Location of the Snowbank study area, Valley County, Idaho

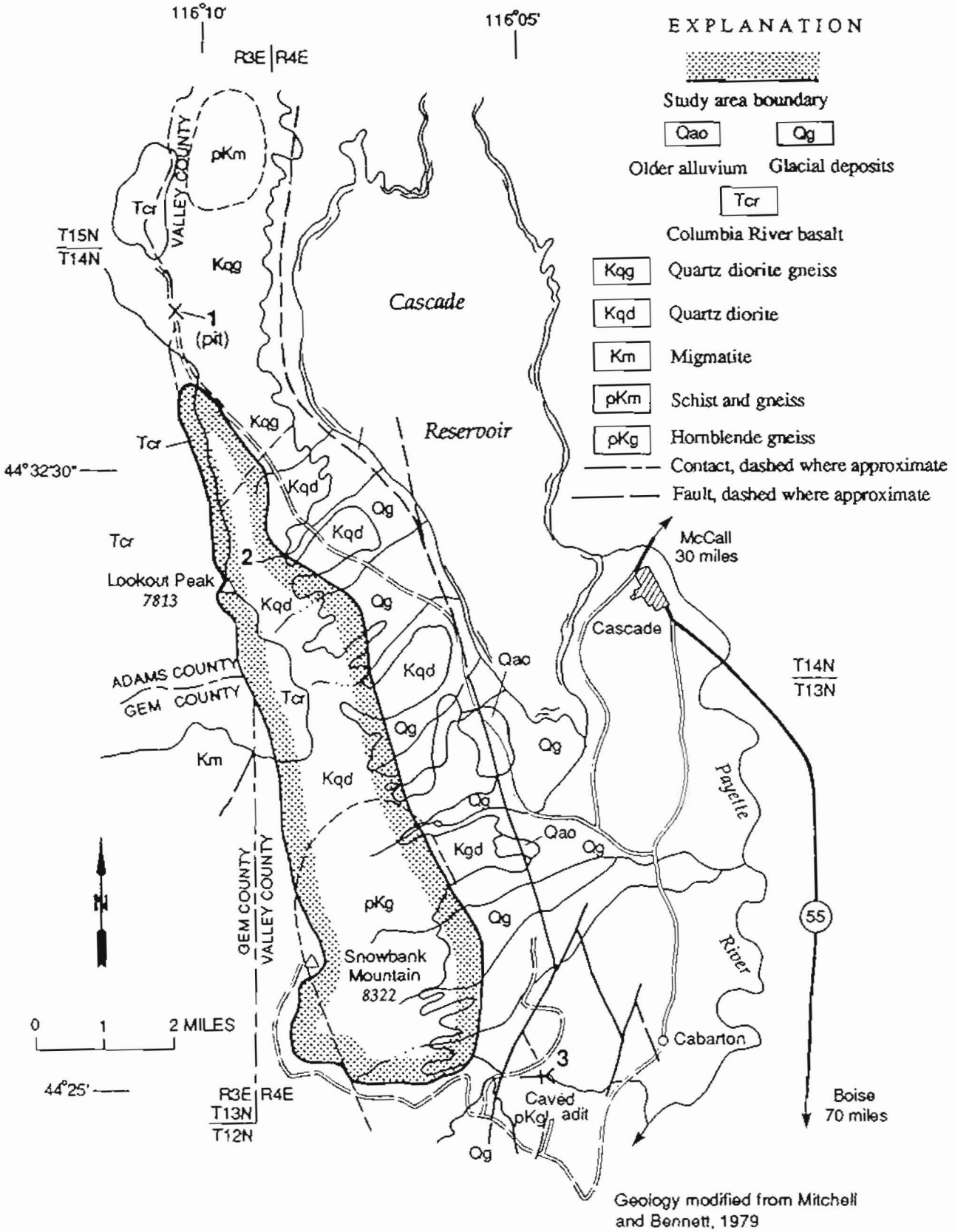


Figure 2.- Prospects and geology in the Snowbank study area and vicinity

Previous Studies

Regional geology and prospect information relevant to the Snowbank study area has been presented by Mitchell and Bennett (1979), Othberg (1982), and Strowd and others (1981). Quaternary geology and black sand placer deposits of Long Valley, directly east of the study area, have been studied by Savage (1961) and Schmidt and Mackin (1970). Aerial geophysical surveys were conducted by Geodata International and High Life Helicopters (1978).

Topical studies include petrographic work on the Idaho batholith by Schmidt (1964), and work on the island arc-continental boundary by Aliberti and Manduca (1988) and Onasch (1977). An overview of the mineral resource potential of national forest RARE II areas in Idaho was reported by Nevins and Oakman (1988). Resource definitions and classification are from the U.S. Bureau of Mines and U.S. Geological Survey (1980). For mineral commodity information, the reader is referred to U.S. Bureau of Mines (1992).

Present Study

The present study consisted of prefield, field, and report preparation phases. Prefield preparation included a library search of pertinent geological and mining literature, perusal of Valley County mining claim records, and examination of BLM (Bureau of Land Management) master title plats and current mining claim recordation data, to search-out historical and actively held mineral properties and property owners. Field work was conducted in 1991. A search was made for mines, prospects, and mineralized areas in, and within 1 mi of, the study area, and included reconnaissance 4-wheel-drive vehicle and foot traverses.

A total of 29 samples were taken: 18 alluvial (reconnaissance pan samples) and 11 rock samples. Reconnaissance pan samples consisted of two 14-in. level pansful [0.008 yd^3] of alluvium partially concentrated in the field. Rock samples included eight random chip, taken at random intervals from homogeneous outcrops, and two continuous chip, taken across a vein of mineralized quartz and fault gouge, and a grab sample of loose rock (float).

Partially field-concentrated alluvial samples were checked for fluorescence and radioactivity and further concentrated on a laboratory-sized Wilfley table at USBM's Western Field Operations Center, Spokane, Washington, and examined for free gold and other heavy minerals. Splits of the alluvial concentrates and rock samples were sent to IGAL, Inc., Analytical Services Division, Cheney, Washington, for geochemical analysis. Digestion for minor-element analysis was by aqua regia; sample splits prepared for whole-rock analysis were fused with lithium tetra- and meta-borate at 1000°C. Minor-element concentrations were determined by AA (atomic absorption), except W, Ba, and Mo were by ICP (inductively coupled plasma-emission spectroscopy), and As, and Sb were digested with hydrochloric acid and hydrogen peroxide and extracted organically; determination was made by flame AA. Whole-rock analysis for major elements was by AA, except Ca, Mg, and Ti were by ICP; concentrations were converted to percent of equivalent oxide. LOI (loss on ignition) was by gravimetric analysis.

ACKNOWLEDGEMENTS

The author would like to thank Mike Diom and Cindy Tencick, Cascade Ranger Station, USFS, for providing helpful logistical advise. Elizabeth Hill, USBM, Spokane, Washington, ably assisted in the field. Theodore Ax, of Nampa, and George, Wilma, and Martin Wilhite, of Kuna, provided information on the Hurdy (Hurley) Creek prospect.

GEOLOGIC SETTING

The Snowbank study area is predominantly underlain by Cretaceous rocks of the Idaho batholith (fig. 2). A narrow strip of Miocene Columbia River Basalt flows cap batholithic rocks along the north half of the western boundary (about 10 percent of the area). The basalt flows appear fresh and unaltered, except for weathering phenomena.

Five lithologic units occur within the batholith in and near the study area, according to Mitchell and Bennett (1979). Two of the units, schist and gneiss (pKm on fig. 2) and hornblende gneiss (pKg), are considered pre-Cretaceous in age, and are thus roof pendants. All batholithic rocks observed during this study, however, are granitoid or at least highly crystalline in texture, and unit contacts appear gradational. Three units, quartz diorite gneiss (Kqg), quartz diorite (Kqd), and migmatite (Km), are considered Cretaceous.

Metamorphic foliation occurs, to some degree, in all batholithic units, and though variable, commonly strikes northerly, subparallel to the mountain ridge. All of the batholithic rocks appear to be predominantly orthogneiss, except, perhaps, the schist and gneiss unit (pKm). The somewhat mafic quartz diorite (Kqd), quartz diorite gneiss (Kqg), and hornblende gneiss (pKg) units suggest this portion of the batholith may represent a southern extension of the eastern margin of the Hazard Creek Complex of Aliberti and Manduca (1988), and evolved within the island arc Wallowa Terrane, but adjacent to the island arc-craton boundary (the Little Goose Creek Complex). Paleozoic miogeosynclinal rocks appear to be absent, perhaps removed by some event prior to middle Cretaceous compressional deformation and emplacement of intrusives.

Tertiary block faulting is responsible for the present mountainous physiography. Major block faulting along Long Valley largely followed the penetrative compressional shearing and mylonized terrane of the Cretaceous Little Goose Creek complex.

The study area was glaciated during the Pleistocene, but glacier-related deposits within the study area include only till and lesser glacial outwash. Periglacial outwash, which elsewhere in the Cascade-Long Valley area includes placer deposits of monazite (Mackin and Schmidt, 1956, p. 375), do not occur in the study area.

MINES AND PROSPECTS

There appears to have been a paucity of mining activity in the Snowbank study area; however, evidence of three prospects was found during library and field searches. Prospect data is summarized in table 1.

Ridgenall and Adam Prospect

The prospect (pl. 1 and fig. 2, no. 1) is a mile north of the northern tip of the study area. A shallow, 20-ft-diameter pit, most likely a dozer scrape, occurs on the east side of a dirt road that extends north along the ridge crest. The pit is shown on the 15-minute USGS (U.S. Geological Survey) Cascade topographic quadrangle, and was reported by Strowd and others (1981, p. 5).

The prospect area is in quartz diorite gneiss of the Idaho batholith. The working is underlain by reddish regolith; no rock cropped out. Trace-element analysis of a subfoliate granodiorite rock sample dug out of the regolith revealed no metallic concentrations indicative of mineralization.

Table 1.--Summary of prospects in the Snowbank study area and vicinity, Valley County, Idaho

Map No. (fig. 2)	Name	Summary	Workings	Sample Data (Pl. 1; table A-1)
BA12/1	Ridgenall and Adams	In quartz diorite gneiss; pit contains reddish regolith, no outcrop.	Shallow, 20-ft-diameter pit; probably a dozer scrape.	One grab sample (no. 1) of granitoid rock from the pit contained no significant metallic concentrations.
BA:23 2	Jones and Morrell	In quartz diorite terrane. A sample, apparently of quartz and fault gouge, submitted to the USBM in 1962, contained minor molybdenite.	None.	Five random chip samples (nos. 5-9) of granitoid rock contained no significant metallic concentrations.
BA12 3	Hurdy (Hurley) Creek prospect	A narrow vein of quartz and fault gouge strikes N. 65° E. and dips 72° SE. Country rock is granitoid hornblende gneiss (foliation strikes N. 5° W., dips 90°).	Only one of three reported adits (Campbell, 1930, p. 275) was found; adit caved 30 ft from portal (fig. 3).	Two chip samples were taken across the vein, one inside and one outside of the portal (fig. 3, nos. 21 and 22). They were 1 ft and 0.2 ft long and contained 6,050 ppb (0.177 oz/ton) and 120 ppb gold, respectively.

Jones and Morrell Prospect

During late 1962, the USBM's Spokane office received a rock sample from W. B. Jones, who, along with his prospecting partner, John Morrell, had explored in the study area near Lookout Peak, then site of the Vanwyck lookout. The rock, reportedly came from 0.5 mi northeast of the peak (fig. 2, no. 2). It was examined petrographically at the USBM Albany (Oregon) Research Center and was found to contain minor molybdenite. Apparently, no further work was done on the prospect; a field search conducted during the present study did not disclose evidence of mineralization or workings. The source locality for the molybdenum-bearing rock was not found.

The prospect area is in quartz diorite terrane, similar to rocks near the Ridgenall and Adam prospect. The sample was reported to contain "...quartz, some clay minerals, limonite, and feldspar, a small amount of ferromagnesian minerals, and very small to trace amounts of molybdenite, biotite, and muscovite," according to H. D. Hess (1962, written commun.), Supervisory Geologist (retired), USBM Albany Research Center. The sample probably consisted of quartz and gouge vein material, based on the first three mineral components listed and the absence of an assigned rock name in Mr. Hess's report.

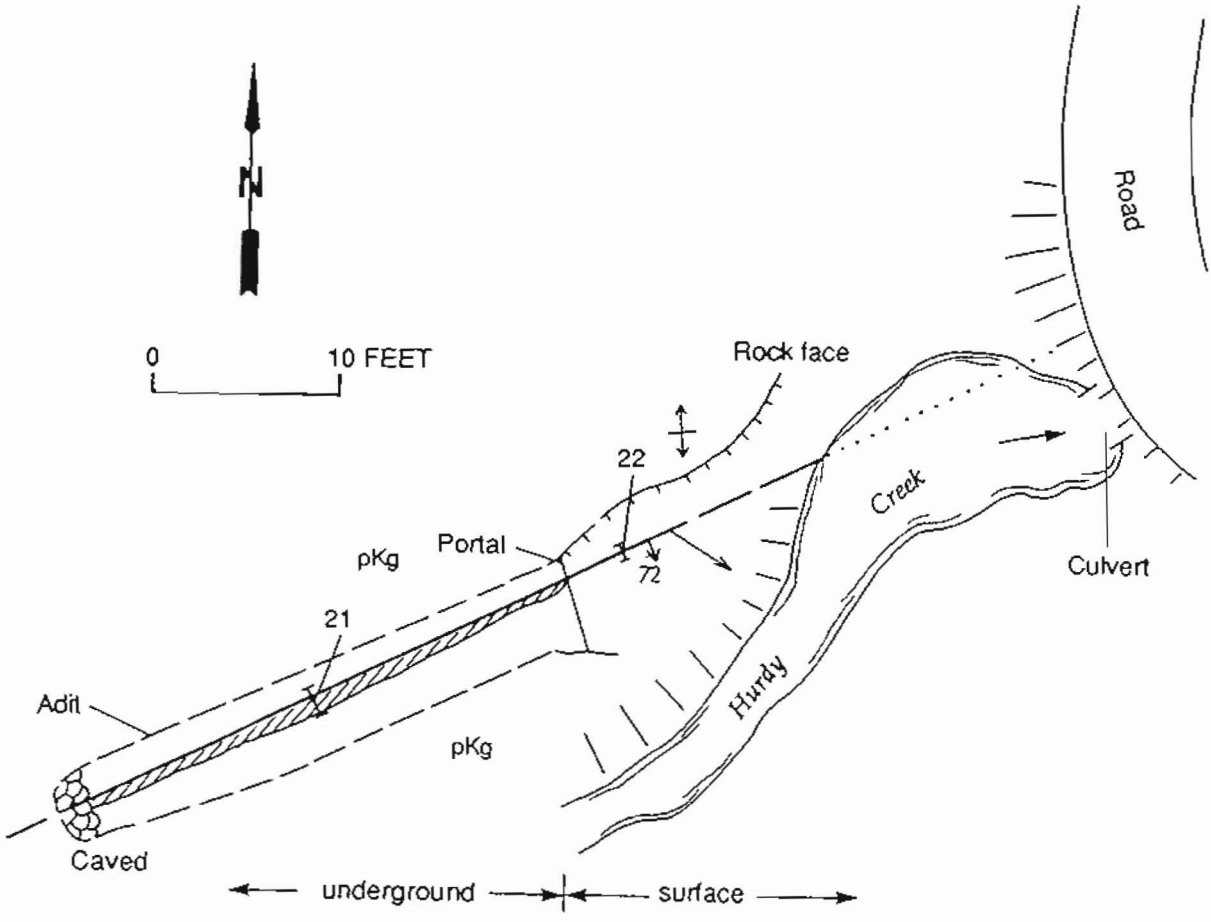
Similar material was not found in the vicinity of Lookout Peak during this study. Analyses of five random chip samples taken from the prospect area (one of basalt and four of granitoid gneiss--pl. 1 and table A-1, samples 5-9) do not contain elevated concentrations of precious-, base-, or indicator-elements indicative of mineralization. Similarly, two reconnaissance pan samples (4 and 10) taken from streams that drain the prospect area contained no significant metal concentrations.

Hurdy (Hurley) Creek Prospect

The prospect area (fig. 2, no. 3) was discovered in 1913 (Bell, 1913, p. 183-184), and was located as the Maloney group of ten claims prior to 1923, in the unorganized Caberton mining district. In 1923, the Hurley Creek Mining and Milling Company was incorporated, and by 1930, development reportedly included three adits, 200 ft, 450 ft, and 1,400 ft long (Campbell, 1930, p. 275). During the 1970's the property was held by Theodore Ax, of Nampa; in 1979, the prospect was relocated as the U Lode, claims 1-7, by Mr. Ax and George W. and Wilma J. (Mr. Ax's daughter) Wilhite, of Kuna. Mr. and Mrs. Wilhite now own the claims. The Hurley Creek adit visited during this study is apparently the 1,400-ft adit described by Campbell. At one time a stamp mill was set up below the portal, but was removed prior to 1970.

The prospect area is underlain by granitoid hornblende gneiss, the foliation of which is of variable strike, but commonly strikes about N. 5° W., parallel to the ridge crest dominated by Snowbank Mountain. Only one of the three adits reported by Campbell (1930, p. 275) was found (fig. 3). It was driven along a quartz and fault gouge vein, which strikes N. 65° E., approximately normal to the regional ridge crest, and dips 72° SE. The adit was caved 30 ft from the portal. Judging by the small dump, the adit had not been very long; however, much of the dump has been washed downstream during floods, due to the close proximity of Hurdy Creek. Part of the dump may also have been incorporated into fill for the adjacent logging road.

Two chip samples were taken across the vein, one inside and one outside of the portal (fig. 3 and plate 1, nos. 21 and 22). They were 1 ft and 0.2 ft long and contained 6,050 ppb (0.177 oz/ton) and 120 ppb gold, respectively.



EXPLANATION

pKg

Hornblende granodiorite gneiss

Quartz and fault-gouge vein

Foliation, dip 90°

Fault, showing rake of slickensides;
dashed where approximate, dotted where concealed

Dump, or road fill

21

Sample locality

Figure 3.- Caved adit at the Hurdy (Hurley) Creek prospect

Placer Reconnaissance

Quaternary alluvial samples were taken from study area drainages to determine if free gold and other valuable heavy minerals were present (pl. 1 and table A-1). The sample concentrates were also analyzed for a suite of trace elements, because high concentrations of some elements, or suites of elements, could indicate the presence of a mineral deposit.

Free gold was found in one stream, Hurdy Creek, the same creek that the Hurley prospect adit is on. The two-level-pansful (0.008 yd^3) sample (no. 20) contained 0.0027 oz gold in the alluvium, worth $1.07 per yd^3 at a $350 per oz gold price.

Geochemical analyses detected significant gold in one other alluvial sample (no. 26); however, the gold was probably not in a free state, but associated with other minerals or possibly plant materials. Trace elements which indicate possible mineralization, such as As (arsenic) and Sb (antimony), were not concentrated, except for Hg (mercury) anomalies, in samples 15 and 18, of 165 ppb and 360 ppb, respectively. Since Hg can occur in the absence of other pathfinder element concentrations (it can be transported as a vapor), the anomaly probably does not indicate the presence of a near-surface mineral deposit.

Geothermal

There is no evidence of geothermal activity within the study area. Directly east of the area, in Long Valley, however, Waring (1965) reported six hot springs; one has a temperature of 100°F, another 90°F, and the remainder are listed as hot. Young and Mitchell (1973) reported a hot spring at Cabarton with a temperature of 70.5°C (159°F) and a discharge of 70 gallons per minute. Ground water reservoirs on Snowbank Mountain are paltry in size compared to the ground water resources in Long Valley, because the water table is intercepted by steep slopes on the mountain. Ground water reservoirs of sufficient size and depth of circulation for geothermal resources do not occur in the study area.

MINERAL RESOURCE EVALUATION

No evidence of metallic mineralization, such as hydrothermal alteration indicative of possible precious- or base-metal deposits, was encountered in the study area. Reconnaissance pan sample analyses (table A-1) also did not indicate the presence of mineralization.

The only mineralization seen was in a narrow fault structure at the Hurley Creek prospect, about 1 mi east of the southeast corner of the study area. The richest sample from the 1-ft-wide vein contained 0.177 oz gold per ton, worth about $60 per ton at a $350 per oz gold price. In order to mine underground, ore commonly needs to be between $100 and $200 per ton. In addition, workings need to be several feet wide to accommodate men and equipment, thus effectively diluting the value of the 1-ft-wide vein by a factor of about five, to a value of $12 per ton.

Bedrock observed in the study area is only suitable for the most basic high bulk and low end value applications, such as crushed aggregate. Numerous sources for crushed stone, however, occur outside the study area and closer to markets.

The possibility of economic placer deposits appears remote. Free gold was detected in one drainage, Hurdy Creek. The gold occurs in concentrations worth about $1.07 per yd^3 (at a $350 per oz gold price), which is too low to be mined at a profit, unless the deposit was very large and mining extraordinarily efficient. Economic placer deposits generally require millions of cubic yards of alluvium containing

multiple dollars per cubic yard in gold. In the study area, however, there are no significant alluvial deposits.

There is no evidence of geothermal resources within the study area, although several notable thermal springs occur in Long Valley (North Fork Payette River) east of the study area. The ground water temperatures in Long Valley are commonly adequate for power generation (over 38°C) using a binary system (Rinehart, 1980, p. 199). Any future development of geothermal resources will probably occur within Long Valley, where there is ample ground water for recharge of deeply circulating hot water systems, rather than high on Snowbank Mountain ridge (the study area) where ground water is scarce.

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APPENDIX

TABLE A-1. -- Trace-element analyses of alluvial concentrate and rock samples from the Snowbank study area, Valley County, Idaho

[Gold value at a $350 per troy ounce, ppb - part per billion, yd - cubic yard, ft - feet, -- - not analyzed; bld - boulders, cbl - cobbles, pbl - pebbles, sd - sand, slt - silt, cly - clay, org - organics; pk -pink, wt - white, grn - granite, sch - schist, blt - basalt, qtz - quartz, < - less than, > - larger than, Fe stns - iron stains, Do... - ditto, recon - reconnaissance, mm - millimeter]

Sample no.	Description	Free gold in ounces/yd^3; value $0.00/yd^3	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples:																	
2	Bedload 65% bld, 15% cbl, 20% matrix (sampled). Sample 20% pbl > 1-in.-, and 40% 0.5-0.25-in.-diameter (pea-size); 40% < pea-size (15% pbl and granules, 10% sd, 10% slt, 5% cly). 85% blt, 20% grn, 15% mafic gneiss.	None	<5	<0.2	58	1	142	<5	<5	<10	1040	<100	5	10	--	--	--
3	Sample 5% cbl, 15% pbl > 1-in.-, and 15% 0.5-0.25-in.-diameter; 65% < pea-size (15% pbl and granules, 20% sd, 15% slt, 15% cly. 80% blt, 30% grn, 10% gneiss.	do..	<5	<.2	43	2	108	<5	<5	<10	802	<100	2	<10	--	--	--
4	Bedload 30% bld, 10% cbl, 60% matrix (sampled). Sample 15% pbl > 1-in.-, and 25% 0.5-0.25-in.-diameter (pea-size); 60% < pea-size (20% pbl and granules, 20% sd, 20% slt). 60% wt grn, 20% blt, and 20% mafic gneiss.	do..	<5	<.2	20	2	65	<5	<5	<10	505	100	2	10	--	--	--
10	Bedload 45% bld, 45% cbl, 10% matrix (sampled). Sample 20% pbl > 1-in.-, and 20% 0.5-0.25-in.-diameter (pea-size); 60% < pea-size (20% pbl and granules, 20% sd, 20% slt). 85% blt, 15% wt grn, and trace mafic gneiss.	do..	<5	<.2	40	2	64	<5	<5	<10	615	<100	1	15	--	--	--
11	Bedload 65% bld, 15% cbl, 20% matrix (sampled). Sample 15% pbl > 1-in.-, and 20% 0.5-0.25-in.-diameter (pea-size); 65% < pea-size (20% pbl and granules, 20% sd, 20% slt, 5% cly). 80% blt, 20% wt grn, and trace gneiss; fine pyrite.	do..	<5	.2	23	107	53	<5	<5	<10	590	<100	2	10	--	--	--
12	Bedload 55% bld, 30% cbl, 15% matrix (sampled). Sample 15% pbl > 1-in.-, and 20% 0.5-0.25-in.-diameter (pea-size); 65% < pea-size (20% pbl and granules, 20% sd, 15% slt, 10% cly). 65% grn (wt > pk), 20% blt, and 15% mafic gneiss.	do..	15	<.2	5	2	20	<5	<5	<10	335	<100	1	10	--	--	--
13	Bedload 45% bld, 25% cbl, 30% matrix (sampled). Sample 10% pbl > 1-in.-, and 30% 0.5-0.25-in.-diameter (pea-size); 60% < pea-size (15% pbl and granules, 15% sd, (1% black sd), slt, 15% cly). 80% pk and wt grn gneiss, 10% blt, 5% qtz, 5% volcanics.	do..	<5	<.2	7	1	31	<5	<5	<10	1720	<100	3	15	--	--	--

TABLE A-1. -- Trace element analyses of alluvial concentrate and rock samples from the Snowbank study area, Valley County, Idaho - continued

Sample no.	Description	Free gold in ounces/yd³; value $0.00/yd³	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Co	Y
Part I, Alluvial Concentrate Samples -- continued:																	
14	Bedload 35% bld, 35% cbl, 30% matrix (sampled). Sample 25% pbl > 1-in.-, and 10% 0.5-0.25-in.-diameter (pea-size); 65% < pea-size (20% pbl and granules, 15% sd, 15% slt, 15% cly). 70% wt and pk grn gneiss, 20% mafic gneiss, 10% blt.	do..	<5	<0.2	8	<2	26	<5	<5	<10	910	<100	2	<10	--	--	--
15	Bedload (< cbl-size)=sample: 15% pbl > 1-in.-, and 25% 0.5-0.25-in.-diameter (pea-size); 60% < pea-size (20% pbl and granules, 20% sd (3% black), and 20 % slt. 55% pk and 20% wt grn gneiss, 10% blt, and 10% sch and 5% qtz.	do..	<5	0.4	9	3	38	<5	<5	<10	795	<100	3	165	--	--	--
16	Bedload 40% bld, 20% cbl, 40% matrix (sampled). Sample 30% pbl > 1-in.-, and 20% 0.5-0.25-in.-diameter (pea-size); 50% < pea-size (25% pbl and granules, 25% sd (2% black sd). 85% wt grn gneiss and 15% biotite hornblende gneiss.	do..	<5	0.8	7	4	26	<5	<5	<10	1325	100	2	30	--	--	--
18	Bedload 40% bld, 20% cbl, 40% matrix (sampled). Sample 20% pbl > 1-in.-, and 30% 0.5-0.25-in.-diameter (pea-size); 50% < pea-size (15% pbl and granules, 35% sd (1% black sd). 75% wt grn gneiss, 15% gneiss and sch, 5% blt, 5% qtz.	do..	<5	0.2	7	2	32	<5	<5	<10	1230	<100	2	360	--	--	--
19	Bedload 30% bld, 30% cbl, 40% matrix (sampled). Sample 15% pbl > 1-in.-, and 25% 0.5-0.25-in.-diameter (pea-size); 60% < pea-size (20% pbl and granules, 40% sd (1% black sd). 60% wt and 30% pk grn gneiss, 5% qtz, and 5% blt.	do..	<5	<.2	6	3	38	<5	<5	<10	705	<100	2	<10	--	--	--
20	Bedload 20% bld, 20% cbl, 60% matrix (sampled); sample 5% cbl, 20% pbl > 1-in.-diameter, 50% pbl > pea-size, 25% small pbl, sd and slt; clasts 50% grn, 20% sch, 15% blt, 15% qtz.	0.0027 oz $1.07/yd	<5	<.2	8	<2	28	<5	<5	<10	510	<100	2	<10	--	--	--
24	Bedload 20% bld and cbl, 80% matrix (sampled); sample 10% cbl, 20% pbl > 1-in.-, 20% < 0.5-in.-diameter, 50% < pea-size (10% pbl/granules, 20% sd, 20% slt and cly); clasts 90% grn, 10% blt.	None	<5	3.2	8	15	57	12	<5	<10	640	<100	2	20	--	--	--
25	Bedload 20% bld and cbl, 80% matrix (sampled); sample 25% pbl > 1-in.-, 25% < 0.5-in.-diameter, 50% < pea-size (25% granules, 25% sd and slt); clasts 60% blt, 40% grn.	do..	<5	<.2	8	5	34	<5	<5	<10	965	<100	3	<10	--	--	--

TABLE A-1. -- Trace element analyses of alluvial concentrate and rock samples from the Snowbank study area, Valley County, Idaho - continued

Sample no.	Description	Free gold in ounces/yd³; value $0.00/yd³	In parts per million, except as noted													
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples -- continued:																	
26	No bld and cbl; 25% > 1-in.-, and 40% 0.5-0.25-in.-diameter (pea-size); 35% < pea-size (20% pbl and granules, 15% sd and slt). 100% blt.	None	1060 (0.031 oz/ton)	<0.2	19	2	98	<5	<5	<10	350	105	2	<10	--	--	--
27	No bld and cbl; 20% > 1-in.-, and 25% 0.5-0.25-in.-diameter (pea-size); 55% < pea-size (20% pbl and granules, 25% sd and slt, and 10% org and cly). 100% blt.	do..	<5	<.2	25	<2	148	<5	<5	<10	495	100	2	10	--	--	--
28	Sample 15% cbl, 20% pbl > 1-in.-, and 20% 0.5-0.25-in.-diameter: 40% < pea-size (10% pbl and granules, 30% sd and slt (including 2% black sd). 100% blt.	do..	<5	<.2	21	4	84	<5	<5	<10	298	<100	2	<10	--	--	--
Part II, Rock Samples:		Sample type/length															
1	Biotite granodiorite, moderately weathered; from bulldozer scrape.	Grab	15	<.1	5	2	99	<5	<5	<10	342	205	<1	10	35	86	5
5	Blocky dark gray basalt, weathers brown; local manganese and Fe stns.	Random chip	20	.1	102	<2	107	<5	<5	<10	1105	145	<1	15	--	--	--
6	Fine-grained, late-phase granitoid injecta from gneissic quartz monzonite; Fe stns after biotite.	do..	13	.2	8	5	39	<5	<5	<10	183	195	1	20	--	--	--
7	Medium-grained hornblende quartz monzonite gneiss; 45% mafic minerals; local manganese stains.	do..	7	<.1	5	<2	82	<5	<5	<10	540	290	<1	10	20	50	11
8	Similar to sample no. 7; foliation strikes N 8°E, dips 83°SE.	do..	<5	<.1	6	<2	132	<5	<5	<10	1012	1705	2	<10	--	--	--
9	Similar to sample no. 7.	do..	15	<.1	6	<2	165	<5	<5	<10	745	1650	<1	240	23	57	10
17	Subfoliate biotite granodiorite; predominant foliate trend is mainly N 10°E; N 60°W-trending vein-like biotite-depleted zones.	do..	28	.2	11	6	17	<5	<5	<10	465	285	1	60	--	--	--
21	Mineralized zone consists of 50% milky quartz and 50% yellow fault gouge; zone strikes N 65°E, dips 72°SE, rake 32°NE; sample taken 15 ft west of the adit portal.	Chip 1 ft	6050 (0.177 oz/ton)	1.3	207	<2	115	5	<5	<10	1210	860	1	75	--	--	--
22	Narrowed mineralized zone represented by milky quartz vein; sample taken at portal.	do.. 0.2 ft	120	.7	45	<2	95	<5	<5	<10	1510	635	1	165	--	--	--
23	Medium-grained hornblende granodiorite gneiss; foliation strikes N 5° E, dips 90°.	Random chip	17	.1	5	2	117	<5	<5	<10	325	405	1	15	--	--	--
29	Grayish black, vesicular basalt; weathers light brown, Fe-stained vesicules. Twenty- by 10-ft outcrop.	do..	10	<.1	95	<2	132	<5	<5	<10	1730	540	2	65	--	--	--

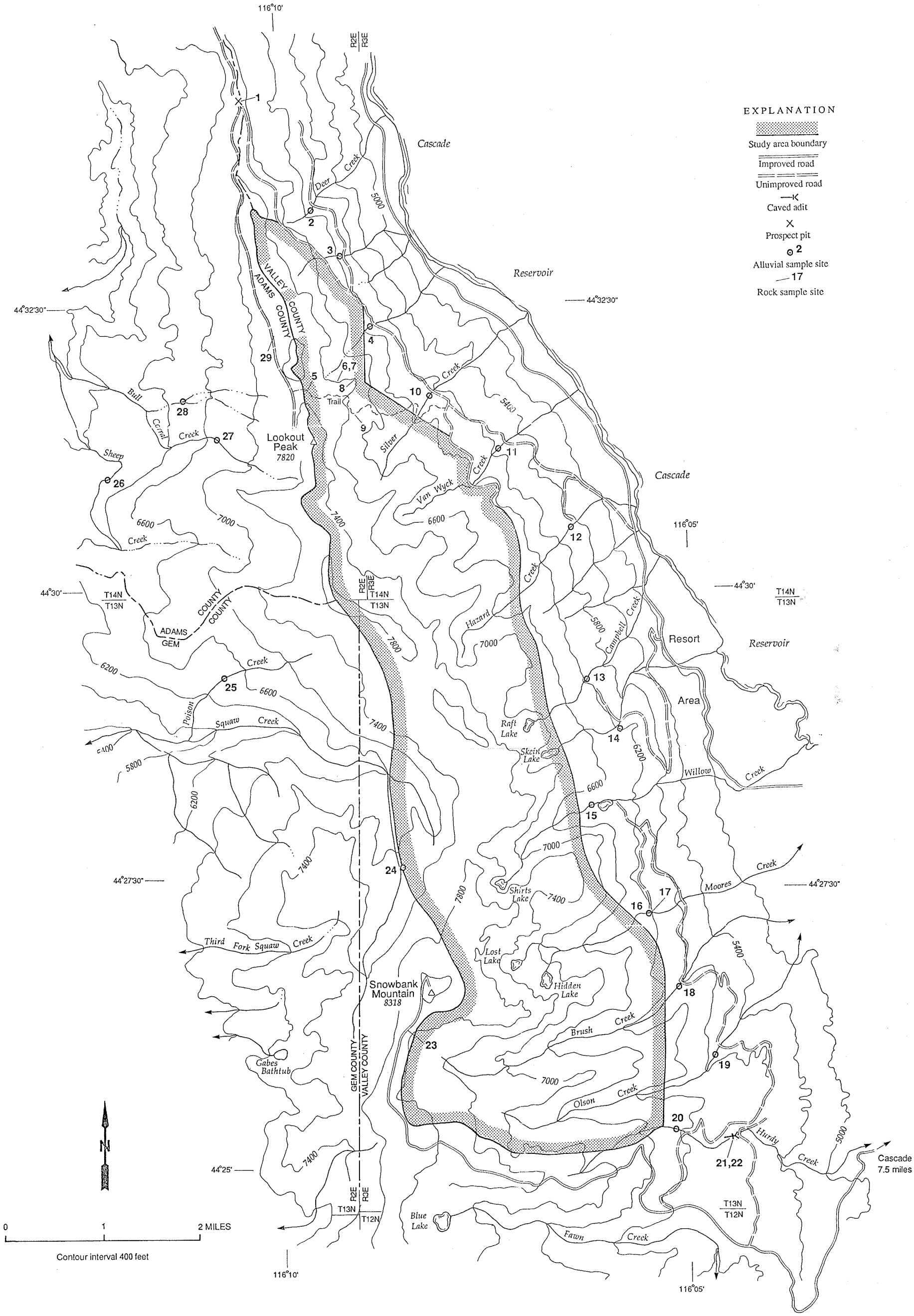

Plate 1.- Sample locations in the Snowbank study area and vicinity, Valley County, Idaho