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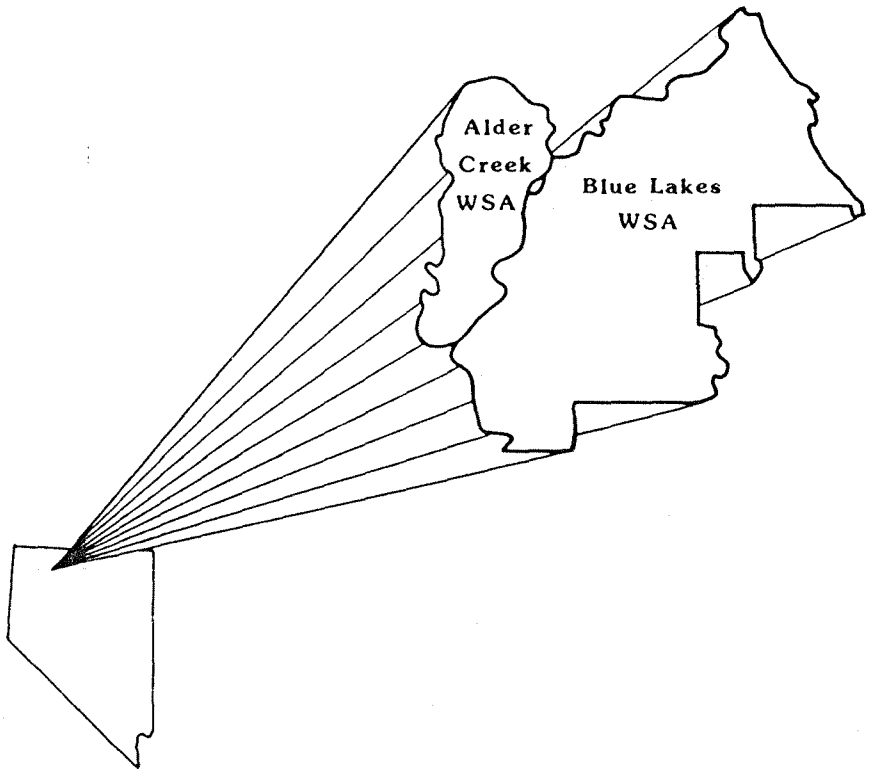
Open File Report

Mineral Resources of the Blue Lakes and Alder Creek Wilderness Study Areas, Humboldt County, Nevada



BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE BLUE LAKES AND ALDER CREEK WILDERNESS STUDY AREAS, HUMBOLDT COUNTY, NEVADA

By
Spencee L. Willett

Western Field Operations Center
Spokane, Washington

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
Robert C. Horton, Director

PREFACE

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and U.S. Bureau of Mines to conduct mineral surveys on U.S. Bureau of Land Management administered land designated as Wilderness Study Areas ". . . 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 survey of the Blue Lakes and Alder Creek Wilderness Study Areas, (NV-020-600 and NV-020-600D), Humboldt County, NV.

This open-file report will be summarized in a joint report published by the U.S. Geological Survey. The data were gathered and interpreted by Bureau of Mines personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, WA 99202. The report has been edited by members of the Branch of Mineral Land Assessment at the field center and reviewed at the Division of Mineral Land Assessment, Washington, DC.

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SUMMARY

In 1984, at the request of the Bureau of Land Management, the U.S. Bureau of Mines conducted mineral surveys of the 20,508-acre Blue Lakes (NV-020-600) and 5,142-acre Alder Creek (NV-020-600D) Wilderness Study Areas (WSAs) in northwestern Humboldt County, Nevada. The WSAs are part of an upthrown, north-south trending fault block associated with the Basin and Range province. Both areas are predominantly underlain by the Cretaceous Duffer Peak pluton which intrudes Triassic metasediments and Jurassic plutonic rocks to the east and Permian Happy Creek volcanics to the south. In the Alder Creek WSA and in the southwest portion of the Blue Lakes WSA, Duffer Peak granodiorite and Happy Creek volcanics are overlain by Tertiary basalt.

No active mines exist within the Blue Lakes WSA; but, several prospects, claims, and mineralized outcrops are in the south and northeast portions. No mineral resources were identified but samples from discontinuous, vein-type deposits contained anomalous amounts of gold, silver, copper, lead, zinc, molybdenum, antimony, and uranium. Very fine, residual gold was detected in nine alluvial samples collected from a small deposit in the southwest corner of the WSA; average gold value was $3.58 per cubic yard (at $350/ounce). Two mines, several prospects, and mineralized outcrops adjacent to the Blue Lakes WSA contain mineralized, irregular structures which do not appear to extend into the Blue Lakes study area.

No mines, prospects, or claims exist within or adjacent to the Alder Creek WSA. Two samples taken near the intrusive-basalt contact yielded anomalous silver values and one contained anomalous molybdenum and uranium values.

INTRODUCTION

This report describes the USBM (U.S. Bureau of Mines) portion of a cooperative study with the USGS (U.S. Geological Survey) to evaluate mineral resources and potential of the Blue Lakes (NV-020-600) and Alder Creek (NV-020-600D) WSAs (Wilderness Study Areas). The USBM examined and evaluated mineralized mines, prospects, claims and sites; the USGS conducted areal geological, geochemical, and geophysical surveys.

Information from these mineral surveys constitutes part of the data base used to determine an area's suitability for wilderness classification. Although the near-term goal is to provide data for land-use decisions, the long-term objective is to help ensure that the Nation has an adequate and dependable supply of minerals at reasonable cost.

Setting

The Blue Lakes and Alder Creek WSAs are in the central portion of the Pine Forest Range in northwestern Humboldt County, NV (fig. 1). Winnemucca, NV, is 85 mi (miles) southeast of the study area and Denio Junction, NV, lies approximately 25 mi to the north. Nevada State

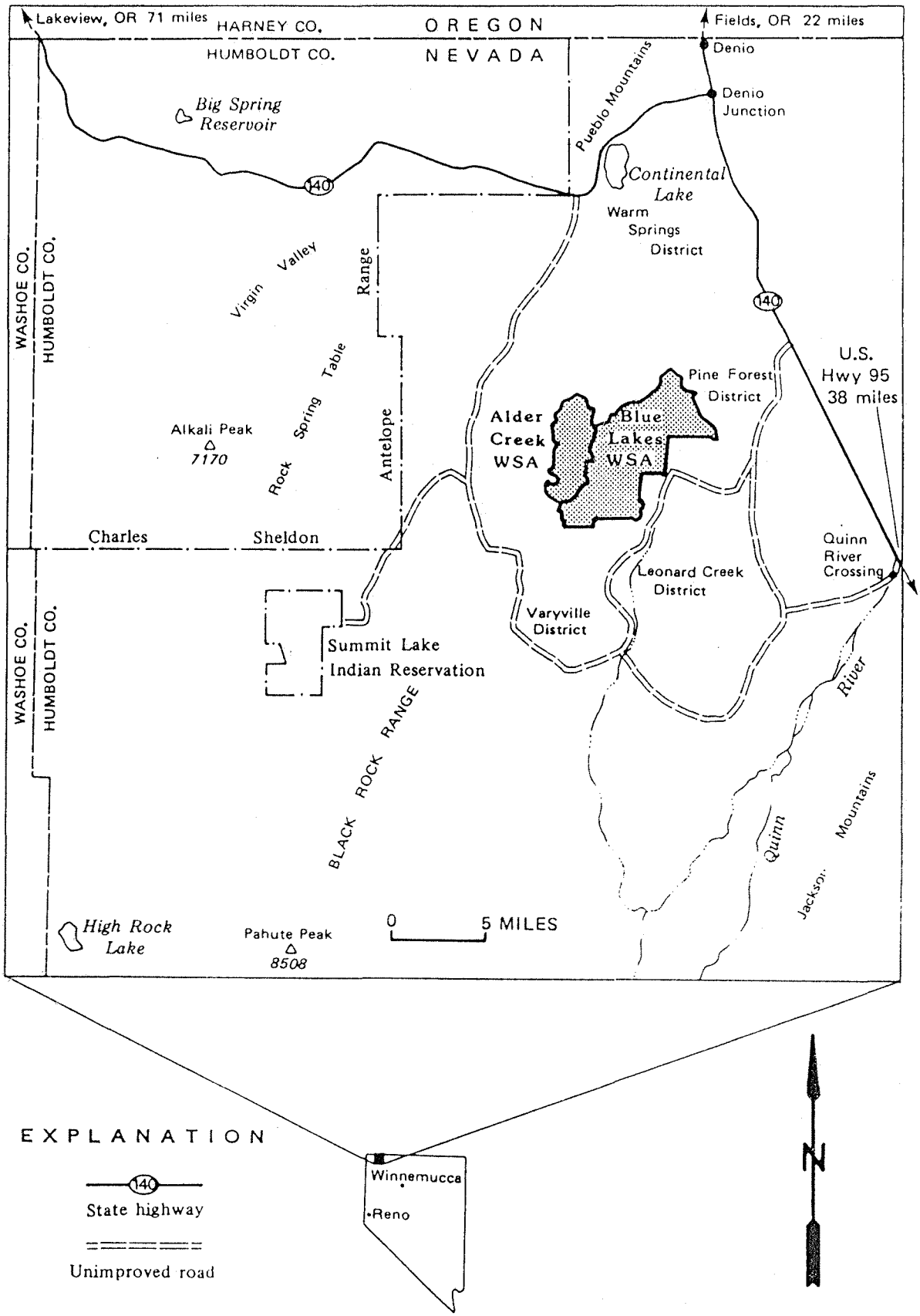


FIGURE 1. – Location of the Blue Lakes (NV-020-600) and Alder Creek (NV-020-600D) Wilderness Study Areas, NV

Highway 140 connecting Denio Junction and U.S. Highway 95 provides access to numerous improved and unimproved roads which approach, surround, and enter the study areas.

Elevations range from 5,800 ft (feet) in the Big Creek drainage on the east side of the Blue Lake WSA to 9,397 ft at Duffer Peak. Terrain varies from steep, glaciated alpine topography around Duffer Peak and Blue Lake to the more predominant rolling hills. Blue Lake occupies a moraine-dammed cirque on the northside of Duffer Peak (Wilden, 1964).

Due to a semi-arid climate, sagebrush is the most prevalent vegetation, but aspen trees commonly grow around streams, springs, and seeps, and mountain mahogany stands grow on some slopes. Temperatures average around 90 °F during the summer and less than 20 °F in the winter with an average precipitation ranging from 8 to 20 in. (inches), most of which occurs during winter months (Bennett, 1973).

Previous Studies

Geology of Nevada is discussed by Stewart and Carlson (1978) and Stewart (1980). Mining districts and mineral production in Nevada are discussed by Raymond (1875), Hill (1912), Lincoln (1923), Couch and Carpenter (1943), Koschman and Bergendahl (1968), and Johnson (1973). Vanderburg (1938) presents information on mining districts and mineral resources of Humboldt County. Geochemical and geostatistical evaluations have been performed in the BLM Winnemucca District by Barringer Resources, Inc. (1982). Geology and mineral deposits of the Pine Forest Range are discussed by Willden (1964). Geology of the northern Pine Forest Range is discussed by Bryant (1970) and Graichen (1972). Smith (1966, 1973) has written on the geology of the southern part of the Pine Forest Range and also compiled a geologic map of the Duffer Peak Quadrangle. Geology and mineral resources of the Blue Lakes WSA are discussed by Bennett (1973). Olander (1980) has written on the geology and mineral occurrences in the Snow Creek drainage area.

Present Study

Prior to field examinations, USBM personnel collected information relating to current and past mining activities within and adjacent to the study area boundaries. Geological libraries and USBM production records and MILS (Mineral Industry Location System) were searched for data pertaining to the area. Also, BLM mining claims recordation indices, BLM land status records, and county claim records were examined. Claim owners and lessees were contacted, when possible, for permission to examine properties and publish the results.

Field work, completed during summer and fall of 1984, involved searches for all prospects and claims indicated by preliminary studies to be within the WSAs. Those found were examined and, if warranted, mapped and sampled. Properties and claims within a mile of the WSA boundary

were studied to determine whether mineralized zones extended into the study areas. In addition, ground and air reconnaissance was performed in areas of obvious rock alteration to check for mining-related activities that may not have been recorded.

One hundred and forty-eight samples were collected from mines, prospects, claims, and mineralized sites within or adjacent to the Blue Lakes WSA, and two samples were collected from mineralized outcrops within the Alder Creek WSA. Chip samples were taken across mineralized structures where possible and grab samples were collected from dumps at prospect sites where no outcroppings occurred or underground workings were caved. Nine channel samples of alluvium were obtained in the Blue Lakes WSA.

All lode samples were pulverized. Several were fire assayed for gold and silver at detection limits of 0.005 and 0.2 oz/ton (ounce per ton), respectively. However, the majority of gold and silver values were determined by a combined FA/ICP (fire assay/inductively coupled plasma) method at detection limits of 0.007 and 0.3 ppm for gold and silver, respectively. Since the FA/ICP method was most frequently requested to check for low range values of gold and silver, results received in ounces per ton are given in this report in parts per million (ppm) for the sake of consistency and comparison.

Quantitative values of other elements were determined by inductively coupled plasma-atomic absorption, colorimetric, and x-ray fluorescence methods and reported in ppm or percent. Antimony and copper values reported as percent also have been converted to ppm. Several samples were analyzed for 40 elements 1/ by semi-quantitative spectrographic methods.

ACKNOWLEDGEMENTS

The author thanks Vic Dunn, Ken Lota, and others from the BLM in Winnemucca, NV, for their cooperation and assistance. Appreciation is extended to Carolyn Dufurrena, formerly of Exxon Minerals, for supplying valuable information pertaining to past uranium exploration activity near the present southern study area boundary. John Lukens generously shared geological information about the Ashdown mine and Pine Forest Range. Sincere thanks is given to the Potter Mining Company for supplying maps and documents pertaining to the Adams mine. USBM, Western Field Operations Center, geologists Mike Hamilton, Vaughn Girol, Steve Munts, Leon Esparza, and Tom Peters ably assisted in field investigations.

1/ Aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, gallium, gold, iron, lanthanum, lead, lithium, magnesium, manganese, molybdenum, nickel, niobium, palladium, phosphorus, platinum, potassium, scandium, silicon, silver, sodium, strontium, tantalum, tellurium, tin, titanium, vanadium, yttrium, zinc, and zirconium.

GEOLOGIC SETTING

The Pine Forest Range is a north-south trending, uplifted fault block in the northwestern sector of the Basin and Range physiographic province.

The entire Pine Forest Range, including the Blue Lakes and Alder Creek WSAs, is predominantly underlain by Mesozoic intrusive rocks. Cretaceous Duffer Peak granodiorite is the most commonly exposed intrusive unit in the WSAs. The oldest intrusive unit exposed in the study areas is Jurassic Theodore quartz diorite which crops out in the northwest sector of the Blue Lakes WSA. New York Peak quartz monzonite crops out in the southwestern portion of the Blue Lakes WSA and is considered to be the next youngest unit based on structural relationships (Olander, 1980). Alaskite and aplite dikes represent the final and youngest intrusive stage and they cut older intrusives, metasediments, and volcanics exposed in the Blue Lakes WSA. Smith and others (1971) proposed that the Cretaceous granitic rocks exposed in northwestern Nevada could represent an intrusive continuity which links the Sierra Nevada and Idaho batholiths.

Pre-intrusive rocks in the Pine Forest Range were initially subjected to the effects of regional metamorphism related to orogenic events and later to contact metamorphism related to granitic intrusions. The Permian Happy Creek volcanic series, consisting predominantly of volcaniclastic material, represents the oldest unit (Olander, 1980. Happy Creek metavolcanics exposed in the southern part of the Blue Lakes area have been intruded by Duffer Peak granodiorite, New York quartz monzonite, and alaskite and aplite dikes. Other pre-intrusive metamorphosed rocks exposed in the Blue Lakes WSA include Triassic quartzite, phyllite, marble, and amphibolite which occur in roof pendants (Smith, 1973).

Tertiary basalt overlies Mesozoic intrusive and Paleozoic volcanic rocks in the southwestern part of the Blue Lakes WSA and also covers Mesozoic Duffer Peak granodiorite in the Alder Creek WSA.

Paleozoic and Mesozoic rocks in northwestern Nevada were structurally deformed and regionally metamorphosed before emplacement of the Cretaceous plutons (Smith and others, 1971, p. 2936). Olander (1980, p. 15) contends that more recent faulting took place predominantly in the Pliocene and resulted in the Pine Forest Range being bounded on the east and west by high-angle normal faults which strike north-south. Olander also observes that uplift was greater on the east side of the range, which accounts for the consistent westward dip also seen in surrounding mountain ranges.

MINING HISTORY

The earliest mining activity in the Pine Forest Range was in 1863 at the present site of the Ashdown mine in the Warm Springs mining district, 7 mi north of the WSA (Graichen, 1972). A small mill was constructed in 1864, but was subsequently burned by hostile Bannock Indians (Vanderburg, 1938). The Ashdown mine, the largest in the district, eventually produced

10,287 oz of gold (Couch and Carpenter, 1943, p. 68). Total production from the district (Couch and Carpenter, 1943, p. 68; USBM records) is approximately 22,870 oz of gold and silver between 1888 and 1981.

The Varyville mining district, in the Pine Forest Range approximately 6 mi south of the WSAs, was first prospected in the 1870's. Couch and Carpenter (1943) show gold production of 184 oz in 1875 and 926 oz in 1936. USBM records indicate 1,704 oz of lode and placer gold were produced from 1935 through 1956.

Placer gold was first discovered about 1914 in the Leonard Creek mining district (Vanderburg, 1938) 3 mi south-southeast of the Blue Lakes WSA. USBM records indicate a total placer production of 9,200 yd^3 (cubic yard) of gravel which yielded 175 oz of gold from 1933 to 1941. Records also show lode production from the Leonard Creek district totaled 1,176 oz of gold from 1936 through 1939.

Earliest recorded production in the Pine Forest (Boyd Basin) mining district was from the Adams mine in 1933. The district abuts the Blue Lakes WSA to the northeast; the Adams mine is adjacent to the boundary. In 1934, Verne Adams and his brother, C. Homer Adams, located 12 claims and formed the Homer Verne Mining Company. The company produced approximately 324 oz of gold between 1933 and 1935 and then awarded a 2-year lease to E. M. Schwartz (R. H. Raring, written commun., 1981). According to Raring, a mining engineer and consultant, Schwartz produced 469 oz of gold and 223 oz of silver from the mine in 1936, but no values were recorded for 1937. USBM records show 1,305 oz of gold and 418 oz of silver were produced by the Homer Verne Mining Co. between 1939 and 1941. The Boyd claims, which encompass the Adams mine, were staked in 1975 and are presently owned by Eva Adams. However, the claims have been under lease to the Potter Mining Co. since 1983.

USBM records indicate the Nevada King mine (Pass Creek mine, American antimony mine), located within 1 mi of the east boundary of the Blue Lakes WSA, produced 22 oz of gold and 1 oz of silver in 1910 and 1911.

In 1979, Exxon Minerals Company staked 551 claims which adjoined to the south or were in close proximity to the present Blue Lakes WSA boundary. After the claims were staked, several holes were drilled to evaluate uranium potential. Conoco also staked 21 uranium claims in 1979 within a mile of the Blue Lakes WSA boundary. According to Humboldt County records, both companies performed final assessment work in 1980 and dropped their claims, presumably due to the depressed uranium market, poor uranium potential, or both.

Humboldt County claim records show the earliest placer and lode activity, within or adjacent to the Blue Lakes and Alder Creek WSAs, as having occurred around the Snow Creek drainage in 1916 and 1924. USBM records indicate a total of 7.28 oz of gold were produced from the Snow Creek area in 1935 and 1936. Approximately 351 lode claims and 5 placer

5 placer claims were located between 1916 and 1980 inside or adjacent to the Blue Lakes WSA according to Humboldt County records. As of March 1985, active claims included 49 lode and 2 placer inside or adjacent to the Blue Lakes WSA boundary. No historical or active claims were found in the Alder Creek WSA.

MINES, PROSPECTS, CLAIMS, AND MINERALIZED SITES

BLM (1983) subdivided the Blue Lakes and Alder Creek WSAs into anomalous zones that reflect mineral potential (fig. 2). The BLM delineated the zones based on geochemical and geostatistical data collected by Barringer Resources, Inc. (1982). Results of this study are presented here using these BLM zone designations; two have been enlarged to encompass nearby, related prospect areas (fig. 3).

Blue Lakes WSA

Big Creek Anomalous Zone

Mineral deposits and occurrences in the Big Creek zone (fig. 3) are mostly related to discontinuous quartz veins which cut Triassic metasedimentary rocks. The veins are often in or near contacts between different metasedimentary units (amphibolite, quartzite, and phyllite) or are near the contact between metasedimentary rocks and Jurassic or Cretaceous intrusives (Smith, 1973).

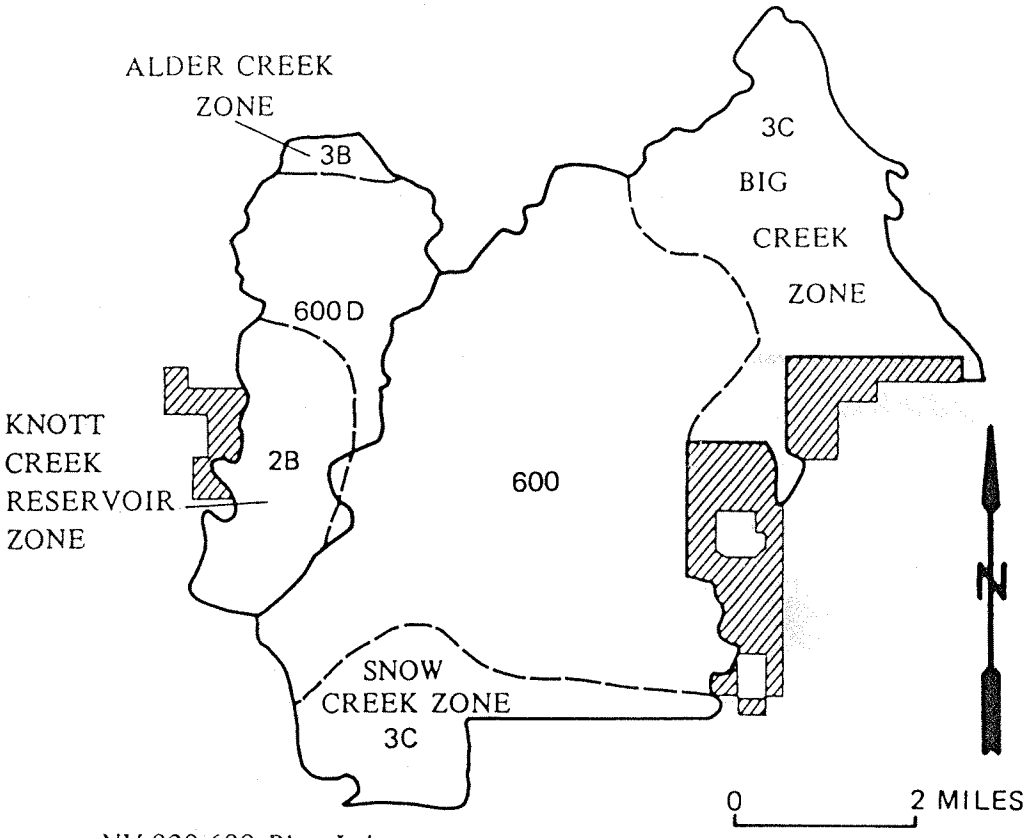
The largest mineral deposit in the expanded Big Creek zone is the Adams mine (fig. 3, no. 1; table 1). Willden (1964) describes the mine as consisting of quartz veins which cut hornfels, schistose sedimentary rocks, quartzite, and slate. Quartz veins generally trend northwest and appear to be controlled by fault-contact zones and genetically related fractures. Most veins carry gold, silver, copper, lead, zinc, or molybdenum values. Silicification was the predominant type of alteration observed around the mine area. The deposits do not extend into the WSA.

The Nevada King mine (fig. 3, no. 17; table 1) is located east of the WSA boundary within the enlarged Big Creek anomalous zone. According to USBM files, antimony ore occurs in discontinuous veins in faults that are essentially parallel to the bedding of phyllite and interbedded quartzite. High-grade pockets are rare. The Triassic metasedimentary rocks appear to constitute a large roof pendant essentially surrounded by plutonic rock (Smith, 1973).

Fifteen other sites within the zone, eight of which are inside the WSA, consist mainly of small quartz veins (table 1) that contained gold, silver, copper, lead, zinc, and molydenum; no resources were identified.

Snow Creek Anomalous Zone

Mineralized and altered zones in the Snow Creek area are on or near the Duffer Peak granodiorite-Happy Creek volcanic series contact (Olander, 1980). Molybdenum, uranium, and precious metal minerals occur along the



NV-020-600 Blue Lakes
NV-020-600D Blue Lakes
(Alder Creek)

FAVORABILITY

1. Unfavorable potential
2. Low potential
3. Moderate potential
4. High potential

LEVEL OF CONFIDENCE

A. Insufficient data
B. Low confidence (indirect evidence)
C. Moderate confidence (direct evidence)
D. High confidence (abundant direct evidence)

EXPLANATION

Wilderness study area boundary

Zone boundary

Private land
(surface & minerals)

FIGURE 2. – Location of anomalous zones as defined by Bureau of Land Management

Mines, prospects, claims and mineralized sites

* Big Creek Zone

† 1. Adams mine
† 2. Prospect
3. Prospect
4. Prospect
5. Prospect
6. Prospect
7. Prospect
8. Prospect
9. Mineralized outcrop
10. Prospect
† 11. Prospect
† 12. Prospect
† 13. Prospect
† 14. Prospect
† 15. Prospect
† 16. Prospect
† 17. Nevada King mine

* Snow Creek Zone

18. Prospect
19. Mineralized outcrop
† 20. Big Dipper group
† 21. Prospect
22. Mineralized outcrop
23. Prospect
24. Mineralized outcrop
25. Prospect
26. Prospect
27. Prospect
28. Arriba placer claim
† 29. Sky View Dyke claim
† 30. Prospect
† 31. Prospect

Knott Creek Reservoir Zone

32. Mineralized outcrop
33. Mineralized outcrop

* Boundaries of zones are expanded from BLM map (Fig. 2) to include selected mines and prospects within one mile of the study area boundary.

† Mines, prospects, and mineralized sites outside of Wilderness Study Area boundary.

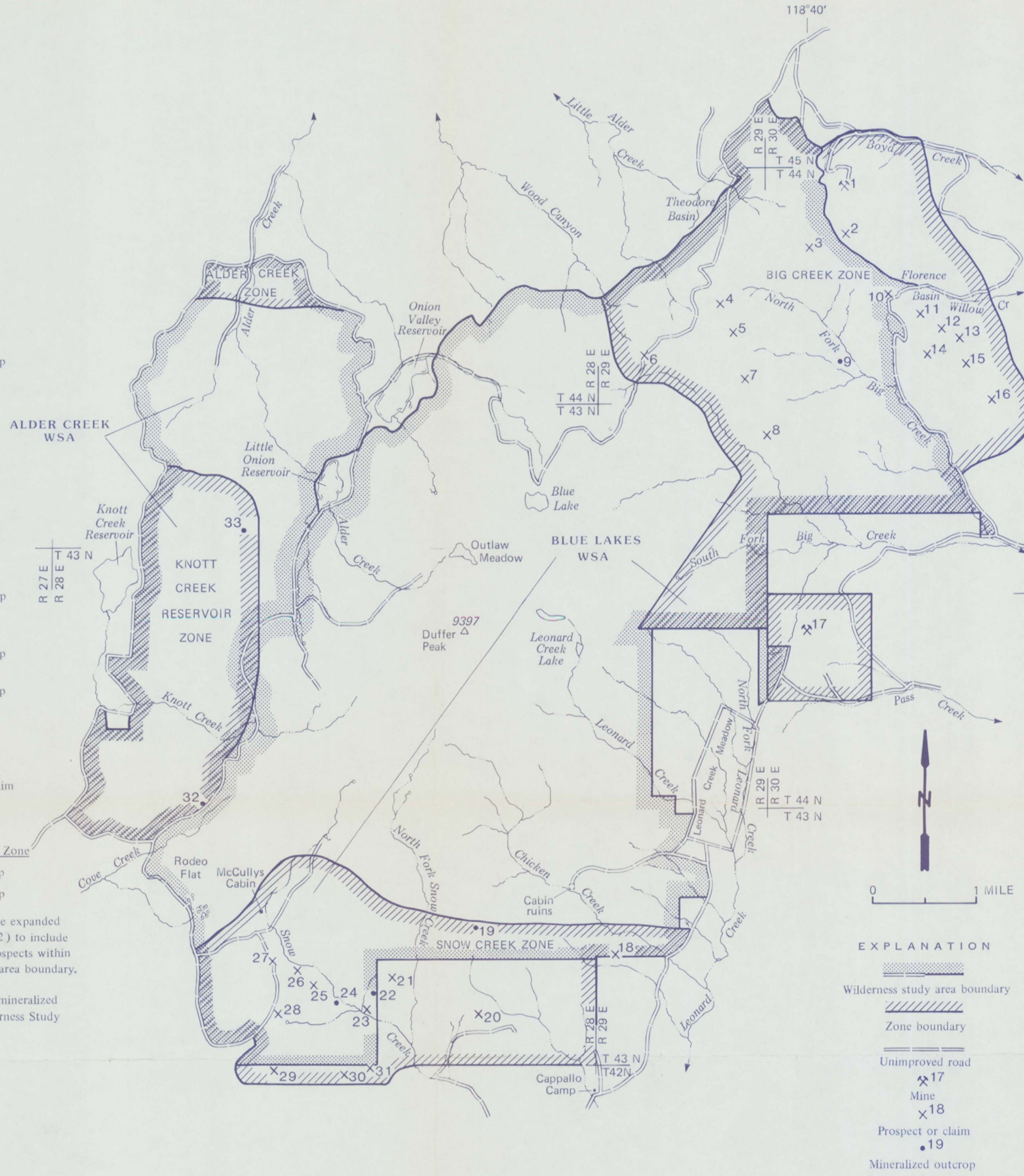


FIGURE 3. – Sample localities in and adjacent to the Blue Lakes (NV-020-600) and Alder Creek (NV-020-600D) Wilderness Study Areas, NV

contact in and around altered alaskite and aplite dikes that cut volcanics, and in quartz veins within the granodiorite (Olander, 1980, p. 42). Olander (1980) proposes that formation of the alteration zones and mineralized areas is related to the release of late stage hydrothermal solutions from the magma chamber in which Duffer Peak granodiorite crystallized.

Molybdenite occurs locally as rosettes, but is more often disseminated in quartz veins and is occasionally accompanied by chalcocite, chalcopyrite, malachite, azurite, and hematite. Altered aplite dikes also contain anomalous molybdenum values at several localities within the Happy Creek volcanics at distances of "200 to 455 meters" from the volcanic-intrusive contact (Olander, 1980, p. 44).

Occurrences of uranium or zones of anomalous radioactivity are associated with altered aplite dikes exposed in Happy Creek volcanics immediately adjacent to Duffer Peak granodiorite (Olander, 1980). Both the dikes associated with uranium mineralization and the surrounding host rocks have undergone moderate to intense alteration. Alteration varies from incipient development of clay minerals to total replacement of aplite and alaskite by secondary silicification (Olander, 1980).

Thirteen lode prospects, claims, and mineralized sites within the Snow Creek anomalous zone are vein-type deposits that contain anomalous gold, silver, copper, molybdenum, and uranium; no resources were identified (table 1).

Very fine, residual placer gold occurs at the Arriba No. 1 claim (table 1) in alluvium which overlies New York quartz monzonite in contact with Happy Creek volcanics and Tertiary basalt. Prospect pits and trenches cover an approximate area of 624,000 ft^2 (square feet) and alluvium ranges in depth from 2.0 ft to 6.5 ft. Judging from the presence of quartz float in the prospect area, the gold was probably derived from vein deposits. Gold content of alluvial samples averaged \$3.58/yd^3 (per cubic yard) at a gold price of \$350/oz. Due to the small size of the deposit, limited water availability, poor access, and randomly distributed gold values, the deposit appears to be uneconomic.

Alder Creek WSA

The Alder Creek WSA contains no known mines, prospects, or claims, and the Alder Creek and Knott Creek Reservoir anomalous zones within the Alder Creek WSA have not been expanded due to the absence of any nearby, related mines, prospects, or claims. The BLM technical report (U.S. Bureau of Land Management, 1983), concludes that uranium and mercury values appear to be related to a narrow capping of Tertiary basalt over Duffer Peak granodiorite. USBM personnel collected two lode samples of quartz vein and aplite dike material in the Knott Creek Reservoir zone near the contact between the basalt and the intrusive (table 2). No extensively mineralized rock was observed and samples contained only minor silver, molybdenum, and uranium.

APPRAISAL OF MINERAL RESOURCES

Field observations and analyses of samples from sites in the Blue Lakes and Alder Creek WSAs indicate the presence of one or more of the following elements in discontinuous quartz veins or alteration zones: gold, silver, copper, lead, zinc, molybdenum, and uranium. Very fine gold occurs in one placer deposit. However, no resources were identified, and none of the sites appear to represent promising exploration targets.

TABLE 1.--Mines, prospects, claims, and mineralized sites in and adjacent to the Blue Lakes Wilderness Study Area

[* Asterisk indicates properties and mineralized sites outside the study area]

Map no.	Name	Geology	Workings and production	Sample and resource data
		Big Creek Anomalous Zone		
* 1	Adams mine	Discontinuous quartz-filled fissures and shear zones, which contain pervasive limonite, specular hematite, and some pyrolusite, strike N. 23° E. to W. 55° W., dip steeply to the east or west, and cut Triassic metasedimentary rocks which have been intruded by Jurassic quartz diorite.	Two main adits and several small caved adits, trenches, and pits. Recorded production from 1935 to 1940 for the Pine Forest mining district (Boyd Basin) was 5,075 tons of ore valued at $27,488 at $35/oz gold (Couch and Carpenter, 1943).	Of 26 samples collected of quartz vein and shear zone material and altered host rock, 19 chip samples contained from 0.017 to 11.32 ppm gold; 9 had 0.946 to 61.745 ppm silver; 6 yielded 8.2 to 340 ppm copper and 230 to 3,700 ppm lead; 8 had 12 to 870 ppm zinc; 10 yielded 1.4 to 23 ppm molybdenum; 1 had 6 ppm tungsten. Seven grab samples contained from 0.710 to 10.286 ppm silver; 6 had 0.041 to 11.96 ppm gold; 4 yielded 34 to 4200 ppm lead and 6.1 to 19 ppm molybdenum; 3 had 22, 200, and 320 ppm zinc; 1 sample contained 6 ppm tungsten.
* 2	Prospect	Siliceously altered quartzite and amphibolite schist are cut by discontinuous milky quartz veinlets measuring 1/4 to 3 in. in shear zones which strike N. 22°-45° W. and dip vertically.	Two caved adits and three shallow pits.	Three chip samples across silicified zones contained a trace to 0.470 ppm gold, 100 to 300 ppm copper, 140 to 1900 ppm lead, and 140 to 700 ppm zinc; two contained 1.7 and 2.6 ppm silver and 9.1 and 16 ppm molybdenum. Three grab samples contained 0.370 to 5.987 ppm silver, 19.2 to 49 ppm copper, and 29.6 to 87 ppm zinc.
3	Prospect	Hydrothermally altered and fractured amphibolite schist containing discontinuous milky quartz veins which have moderate limonite stains and a trace of pyrite.	Four shallow pits.	Two chip samples contained 0.028 and 0.041 ppm gold and 34 and 49 ppm zinc; 0.500 ppm silver occurred in one and 5.4 ppm molybdenum in the other. Two grab samples contained 0.018 and 0.046 ppm gold, 25.9 and 49 ppm copper, and 35 and 64 ppm zinc; one contained 12 ppm molybdenum and 6 ppm tungsten.
4	Prospect	Siliceously and sericitically altered quartz-mica schist is moderately bleached and limonite stained.	Three shallow pits.	Three grab samples contained 0.016 to 0.117 ppm gold, 110 to 400 ppm copper, 58 to 96 ppm zinc, and 8.3 to 16 ppm molybdenum; two assayed 0.400 and 5.2 ppm silver; one contained 150 ppm lead and another had 280 ppm tungsten.
5	Prospect	Clay-rich and siliceously altered lensoid-shaped zone with moderate limonite content strikes N. 70° E., dips 60° W., and is hosted in amphibolite schist.	One shallow pit.	One chip sample contained 0.026 ppm gold, 150 ppm copper, and 2.7 ppm molybdenum.

TABLE 1.--Mines, prospects, claims, and mineralized sites in and adjacent to the Blue Lakes Wilderness Study Area--Continued

Map no.	Name	Geology	Workings and production	Sample and resource data
6	Prospect	Discontinuous, limonite-stained, bull quartz veinlets in a fracture zone strike N. 30° W. and dip 67° NE.	Five shallow pits.	One chip sample contained 0.016 ppm gold, 62 ppm copper, 140 ppm lead, 310 ppm zinc, and 40 ppm molybdenum. One grab sample had 0.013 ppm gold and 16 ppm molybdenum.
7	Prospect	Bull quartz boulders up to 3 ft in diameter occur in float surrounded by bleached, limonite-stained, sericitically and siliceously altered biotite schist country rock.	One shallow pit.	One chip sample contained 0.072 ppm gold, 7.758 ppm silver, 1,300 ppm copper, 94 ppm lead, 340 ppm zinc, and 190 ppm molybdenum. One grab sample yielded 0.070 ppm gold, 1.714 ppm silver, 380 ppm copper, and 8.8 ppm molybdenum.
8	Prospect	Moderately limonite-stained, translucent to white quartz veins strike N. 10° E. and dip 50° W. to vertically, and cut biotite schist which is altered to clay around veins.	Two pits.	Of three chip samples, two contained 0.037 and 0.050 ppm gold, 42 and 47 ppm copper, 100 and 340 ppm zinc, and 11 and 43 ppm molybdenum; one has 120 ppm lead. Three grab samples contained 0.022 to 0.223 ppm gold and 15 to 20 ppm molybdenum; two had 71 and 700 ppm copper; one contained 3.783 ppm silver and 130 ppm zinc.
9	Mineralized outcrop	Quartz diorite with minor chloritic alteration is locally cut by aplite dikes up to 2 in. thick which strike N. 80° E. and dip 47° NW.	None.	One 4-ft random chip contained 0.045 ppm gold, 55 ppm copper, 69 ppm lead, 95 ppm zinc, and 21 ppm molybdenum.
10	Prospect	Moderately limonite-stained, clear to white quartz veins are hosted by amphibolite and biotite schist which show siliceous and sericitic alteration.	Five shallow pits.	One chip sample contained 0.059 ppm gold, 96 ppm copper, 100 ppm zinc, and 13 ppm molybdenum. Of four grab samples, one had 0.018 ppm gold and another had 1.223 ppm silver; one contained 390 ppm copper; three had 4.1 to 37 ppm zinc and four contained 2.6 to 23 ppm molybdenum.
* 11	Prospect	Bull quartz vein material with slight limonite stains and chloritically altered amphibolite and biotite schist is on dumps.	One shallow bulldozer cut 90 ft in length and one shallow pit.	Two grab samples yielded 0.062 and 0.011 ppm gold, 0.700 and 1.201 ppm silver, and 11 and 14 ppm molybdenum; one also contained 47 ppm copper and 56 ppm zinc.
* 12	Prospect	White quartz with minor limonite stains occur as float in quartz diorite.	One pit.	One grab sample contained 0.154 ppm gold, 0.740 ppm silver, and 18 ppm molybdenum.

TABLE 1.--Mines, prospects, claims, and mineralized sites in and adjacent to the Blue Lakes Wilderness Study Area--Continued

Map no.	Name	Geology	Workings and production	Sample and resource data
* 13	Prospect	Fractured bull quartz and moderately altered, iron-stained quartz diorite occur as float.	One shallow pit.	One grab sample had 0.050 ppm gold, 0.937 ppm silver, 50 ppm copper, and 19 ppm molybdenum.
* 14	Prospect	Quartz-rich zone with abundant limonite measures 2.5 ft in width and 4 ft in length, and is hosted by quartz diorite.	Two shallow pits.	One chip sample contained 0.020 ppm gold and 7.8 ppm molybdenum. One grab yielded 0.023 ppm gold, 83 ppm copper, 47 ppm lead, 140 ppm zinc, and 13 ppm molybdenum.
* 15	Prospect	Weakly to moderately iron-stained white quartz veins 2 to 4 ft thick, strike N. 45°-60° W. and dip vertically, and are hosted by quartz diorite.	Two shallow pits.	Two chip samples contained 0.027 and 0.030 ppm gold, 75 and 100 ppm copper, and 22 and 23 ppm molybdenum.
* 16	Prospect	Moderately limonite-stained, fractured quartz vein in quartz diorite strikes N. 62° W. and dips 36° NE., and varies in width from 10 in. to 3.5 ft within a distance of 10 ft.	One shallow pit.	One chip sample contained 0.050 ppm gold, 1.174 ppm silver, 49 ppm copper, and 13 ppm molybdenum.
* 17	Nevada King mine (Pass Creek mine, American antimony mine, Stybo claims)	Sparsely scattered pockets of antimony ore are in hydrothermally altered, discontinuous, brecciated shear zones that strike N. 23° E. to W. 71° W. and dip steeply to the NE, and lie in close proximity to the contact between Triassic quartzite and phyllite.	Two caved adits, one shaft, and 14 shallow pits and trenches. Bureau of Mines production records show 22 oz of gold and 1 oz silver produced in 1910 and 1911. In 1927, 30 tons of 50% antimony grade ore were produced and in 1941 and 1942, 13 tons averaging 50% grade antimony ore were produced.	Of 19 chip samples collected, 11 yielded 0.003 to 0.718 ppm gold and 4 contained 0.360 to 8.3 ppm silver; 17 had 10.6 to 9,800 ppm antimony; two contained 2.0 and 3.1 ppm uranium; one yielded 6.8 ppm zinc and 50 ppm molybdenum. Seven grab samples yielded 0.059 to 0.118 ppm gold; three contained 3.0, 16.7, and 2,500 ppm antimony, and two had 1.5 to 50 ppm molybdenum.
		Snow Creek Anomalous Zone		
18	Prospect	Contact zone between phyllite and granodiorite, cut by garnet-bearing pegmatite, shows siliceous and argillic alteration.	One shallow pit.	Of three chip samples, two contained 6.9 ppm and one had 10.3 ppm silver; two yielded 1.3 and 7.4 ppm molybdenum; one had 4.4 ppm uranium. One grab sample contained 6.9 ppm silver, 43 ppm copper, and 12 ppm molybdenum.
19	Mineralized outcrop	Three moderately iron-oxide stained, parallel quartz veins range in thickness from 3 to 12 in., strike N. 70° W. and dip 40° N., and are hosted by slightly altered granodiorite.	None.	One chip sample across quartz veins yielded 52 ppm zinc, 59 ppm molybdenum, and 0.70 ppm uranium.

TABLE 1.--Mines, prospects, claims, and mineralized sites in and adjacent to the Blue Lakes Wilderness Study Area--Continued

Map no.	Name	Geology	Workings and production	Sample and resource data
* 20	Big Dipper group	Discontinuous quartz veins in granodiorite range in thickness from 1 to 6 in., strike N. 10° E. to N. 85° E., and dip vertically or steeply to the east and west. Discontinuous, podiform, and lensoid aplite and alaskite dikes cut Happy Creek volcanics in contact with Duffer Peak granodiorite. Molybdenum, uranium, and tungsten minerals are associated with the quartz veins and aplite and alaskite dikes.	Five shallow pits and four shallow trenches.	Ten chip samples of contact zone material, discontinuous quartz veins, and aplite and alaskite dikes: two yielded 0.009 and 0.023 ppm gold and eight yielded 0.530 to 20.572 ppm silver; four contained 150 to 1,500 ppm copper; eight had 5.5 ppm to 270 ppm molybdenum; one contained 6.8 ppm zinc, five had 6.1 to 58 ppm uranium, and two contained 6 ppm tungsten. Of six grab samples collected from dumps and high grade piles, two yielded 0.028 and 0.083 ppm gold; three contained 0.770, 6.730, and 20.572 ppm silver; five had 9.5 to 400 ppm molybdenum; one yielded 24 ppm lead and another had 1.4 ppm uranium.
* 21	Prospect	Discontinuous, 3.5-ft-thick quartz vein strikes N. 45° E. and dips 25° NW., and cuts granodiorite host rock.	Two shallow pits.	Two chip samples contained 0.047 and 0.050 ppm gold, 0.997 and 2.964 ppm silver, 46 and 81 ppm lead, 1 and 70 ppm zinc, 16 and 43 ppm molybdenum, and 2.3 and 14 ppm uranium. One grab sample had 0.024 ppm gold, 2.577 ppm silver, 93 ppm lead, 79 ppm zinc, 66 ppm molybdenum, and 8 ppm arsenic and 26 ppm uranium.
22	Mineralized outcrop	Discontinuous, 1.0-ft-thick limonite-stained quartz vein cuts chloritically altered granodiorite.	None.	One chip sample contained 1.1 ppm uranium and 8 ppm tungsten; no gold or silver detected.
23	Prospect	Fine- to medium-grained granodiorite float contains quartz veinlets.	One shallow pit.	One grab sample contained 0.780 ppm silver and 3.0 ppm uranium.
24	Mineralized outcrop	Siliceously altered contact zone between volcanics and granodiorite has been intruded by aplite dikes.	None.	Two chip samples contained 10.287 ppm silver, 4.9 and 6.3 ppm molybdenum, and 2.7 and 5.0 ppm uranium.
25	Prospect	Contact zone between volcanics and granodiorite is cut by aplite dikes and occasional smokey quartz veins.	One shallow pit.	Of two chip samples, one contained 2.333 ppm silver and the other had 3.8 ppm uranium and 8.4 ppm molybdenum.
26	Prospect	Near their contact, Happy Creek volcanics and Duffer Creek granodiorite are cut by quartz veinlets.	One shallow prospect pit.	One grab sample yielded 20.572 ppm silver.

TABLE 1.--Mines, prospects, claims, and mineralized sites in and adjacent to the Blue Lakes Wilderness Study Area--Continued

Map no.	Name	Geology	Workings and production	Sample and resource data
27	Prospect	Bull quartz vein is in quartz monzonite which is occasionally cut by small pegmatite veinlets.	One L-shaped pit.	One chip sample had 6.981 ppm silver. Two grab samples contained 0.520 and 0.650 ppm silver and 7.8 and 12 ppm uranium.
28	Arriba No. 1 claim	Localized alluvium is predominantly composed of quartz monzonite and basalt. According to Olander (1980), most of the pits and trenches overlie Cretaceous New York quartz monzonite with several situated over Permian Happy Creek volcanics and some near the contact between a Tertiary basalt inclusion and the other two units.	Fourteen trenches ranging in length from 22 ft to 570 ft, in width from 3 ft to 6 ft, and in depth from 1.0 ft to 6.5 ft. Approximately 35 shallow pits ranging in diameter from 3 ft to 20 ft. Collectively the workings cover approximately 624,000 square ft and depth of alluvium ranges from 2.0 to 6.5 ft.	Nine channel samples, collected from four trenches and two pits, contained between 0.3 cents and $13.47/yd^3 with an average value of $3.58/yd^3 at a gold price of $350/oz. Due to the small size of the deposit, limited water availability, poor access, and randomly distributed gold values, the deposit appears to be uneconomic.
* 29	Sky View Dyke claim	Felsite breccia with interstitial and vug fillings of azurite, malachite, and limonite is surrounded by Tertiary basalt.	Four shallow pits and one trench.	Of three chip samples, two contained 0.016 and 0.039 ppm gold; three yielded 30, 5500, and 41000 ppm copper; one had 5.579 ppm silver and another contained 36 ppm zinc. Of three high-grade grab samples, two contained 0.018 and 0.065 ppm gold and 0.420 and 7.293 ppm silver; three yielded 1.04, 4100, and 35000 ppm copper; one contained 150 ppm zinc. Five samples yielded 1.8 to 3.9 ppm uranium.
* 30	Prospect	Quartz vein material and phyllite float is weakly to moderately sericitically and argillically altered.	Three shallow pits.	Three grab samples had 0.033, 0.039, and 0.054 ppm gold and 21 ppm molybdenum; two contained 47 and 62 ppm zinc and 1.6 and 1.8 ppm uranium; one had 41 ppm copper.
* 31	Prospect	Discontinuous bull quartz veinlets and limonite-filled fractures occur in phyllite and quartzite.	Four shallow pits.	Of five grab samples, four contained 0.019 to 0.066 ppm gold; two had 0.650 and 1.616 ppm silver; five yielded 0.85 to 2.3 ppm uranium.

TABLE 2.--Mineralized sites in the Alder Creek Wilderness Study Area

Map no.	Name	Geology	Workings and production	Sample and resource data
32	Mineralized outcrop	Moderately limonite-stained quartz float is near contact between granodiorite and basalt.	None.	One grab sample yielded 13.714 ppm silver.
33	Mineralized outcrop	Several small aplite dikes are near the contact between granodiorite and basalt.	None.	One chip sample taken across an aplite dike contained 10.286 ppm silver, 14 ppm molybdenum, and 2.8 ppm uranium.

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