U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Locatable Mineral Reports for Colorado, South Dakota, and Wyoming provided to the U.S. Forest Service in Fiscal Years 1996 and 1997

by

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Open File Report OF 97-535

1997

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FIGURES

[All but one of the following figures are geologic maps. Complete citations are provided on the figures.]

INTRODUCTION

The U.S. Geological Survey is required by Congress (under Public Law 86-509) to provide Locatable Mineral Reports to the U. S. Forest Service whenever National Forest System lands are sold or exchanged. This volume is a compendium of the 22 reports already provided to the Forest Service by the author in fiscal years 1996 and 1997. (Four additional reports, written by Gary R. Winkler, are not contained in this volume.) Altogether, the reports describe the geology and mineral and (or) energy resource potential of 125 properties covering about 17,000 acres in 13 National Forests.

Locatable Mineral Reports must be generated promptly and provide complete and reliable information even though the sizes of land parcels and degree of difficulty in producing the reports varies. Each report must be researched and written using library resources, agency databases, professional experience, and interviews with other geoscientists as appropriate--no field work was funded. The reports were not formally reviewed, but appropriate scientists were asked to give informal feedback before they were submitted to the Forest Service. Copies of the reports reside in the U.S. Geological Survey's Mineral Resource Program and U.S. Forest Service files.

Many of these land exchanges are for mutual convenience to gather both Federal and private lands into manageable blocks. Some are proposals by towns, counties, and states to enhance the "common good". Others are motivated by ranchers to improve their grazing lands and efficiency of their operations. Many recent land exchange proposals are directed toward acquisition of public lands in high-value recreation areas (such as ski areas). The potential for litigation, controversy, and politics is much higher when land exchanges involve "high-value real estate" than when exchanges involve common grazing lands. Hence, our locatable mineral reports must be reliable enough to withstand scrutiny of litigants vying for "high-stakes" real estate.

Twenty-two reports are included in this volume. They are grouped by State, then alphabetically by Forest. Each report starts with a page or more that summarizes the locations of the properties (either verbatim or paraphrased from descriptions supplied by the Forest Service). Geologic descriptions of the properties, mineral potential, and references comprise the main body of each report. Figures and attachments, if any, follow. The figures, normally photocopies of cited references, are provided only for the convenience of the Forest Service minerals examiner--they have not been redrafted.

COLORADO

LOCATABLE MINERAL REPORT FOR THE SLATE CREEK LAND EXCHANGE OFFER, ARAPAHO NATIONAL FOREST, ADMINISTERED BY WHITE RIVER NATIONAL FOREST, SUMMIT COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

May 1, 1997

EXHIBIT A: Property that the U.S. Forest Service shall consider exchanging:

		acres	total acreage
T7S, R77W, 6th Principal Meridian:			
Parcel A:	Fredonia Gulch	4.5	
Parcel B:	Tri-lots	2	
Parcel C:	Town of Breckenridge/Boreas	27.3	
			33.8
T6S, R77W, 6th Principal Meridian:			
Parcel D:	Breckenridge/Claimjumper	37.6	
Parcel E:	Agape	4.5	
			42.1
T5S, R78W, 6th Principal Meridian:			
Parcel F:	Buffalo Mtn/Mesa Cortina	109.29	
Parcel G:	Frisco	12.8	
			122.09
T5S, R77W, 6th Principal Meridian:			
Parcel H	Summerwood	2.46	
Parcel I	Soda Creek	4.42	
Parcel J	United Church of Christ	10	
			16.88
T4S, R78W, 6th Principal Meridian:			
Parcel K:	Pebble Creek	6	
Parcel L:	Hill	35	
Parcel M:	Triple Creek Ranch	20	
Parcel N:	Pioneer Creek	40	
Parcel O:	Ox Bow Ranch	2.8	
			103.8
T3S, R79W, 6th Principal Meridian:			
Parcel P:	Mt. Powell/Cohen	7.81	
Parcel Q:	Mt. Powell/Gary	183	
Parcel R:	Mt Powell/Palmer's Knob	80	
			270.81
T3S, R78W, 6th Principal Meridian:			
Parcel S	Mt. Powell/Gary	3.87	
Parcel T	Horse Barn	11	
			14.87

Acreage USFS will consider exchanging:			**604.35**

EXHIBIT B: Property that Western Land Group shall consider exchanging:

	total acreage
T3S, R78W, 6th Principal Meridian:	
1. Slate Creek Property	160
T5S, R78W, 6th Principal Meridian:	
2. North Tenmile Property	35
T8S, R78W, 6th Principal Meridian:	
3. Bemrose Ski Circus	121.89
T6 and 7S, R76 and 77W, 6th Principal Meridian:	
4. Parkville	625
T3S, R79W, 6th Principal Meridian:	
5. Heeney Cutoff River Access	5
T7S, R77W, 6th Principal Meridian:	
6. Fredonia Public Access	4.5
T3S, R78W, 6th Principal Meridian:	
7. Blue River Access	4.9
Acreage Western Land Group will consider exchanging:	**956.29**

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. Information from these sources may be augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

All of the tracts under consideration for exchange are near the northeastern extension of the Colorado Mineral Belt. Some of the tracts are in the Breckenridge and Upper Blue River mining districts. The remainder of the tracts are outside the mining districts. The Breckenridge district primarily produced gold from placers although it also produced lode gold and lead-silver ores. Placer gold was discovered on Farncomb Hill in 1859 but it wasn't till 1880 that gold was found in place there. Gold dredges were introduced in 1898. Lead-silver mining began in 1869.

The Breckenridge area was mapped and the mineral deposits studied by Ransome (1911), Lovering (1934), and Lovering and Goddard (1950). The Upper Blue River area was studied by Singewald (1951). Regional geologic mapping in the early 1970's (Tweto, 1973; Tweto and Reed, 1973; Tweto and others, 1978) shows the region in broader context. Karl Kellogg (USGS) is currently mapping the Dillon 15-minute quadrangle. Mineral resource potential has been summarized by Brown (1990) and Toth and others (1993).

The assessment by Toth and others (1993) at 1:250,000 scale indicates potential for placer gold (p. 76-79), polymetallic skarn (p. 54-57), polymetallic vein (p. 63-67), and polymetallic replacement (p. 57-60) deposits in the Breckenridge and Upper Blue River areas. No resource potential was identified in the northern portion of the Blue River south of Green Mountain Reservoir. Each of these four deposit types is summarized from Toth and others (1993):

Placer Gold

Areas of high resource potential for medium-sized deposits of placer gold and silver downslope and downstream from known lode gold deposits were identified from Hoosier Pass to Dillon Reservoir including French Gulch and Swan River. Gold might be recovered by reworking old dredge tailings in these rivers and their tributaries because former mining methods were inefficient.

Polymetallic skarn

Two small areas south of Prospect Hill have moderate potential for metals in small skarn deposits. Silicates formed in the limey beds of the Niobrara and Morrison Formations and some of the beds contain appreciable amounts of gold and copper. Ore bodies are usually small, spotty, and irregular and cluster closely around the quartz monzonite porphyry.

Polymetallic vein

The area that encompasses most of the Breckenridge mining district has high resource potential for large deposits of base and precious metals in veins. The district's most productive deposits of this type extend from Little Mountain to Mineral Hill (tracts B and C flank this NE-trending line). The high potential area is surrounded by a much larger area of moderate potential. Metals occur along faults in Proterozoic crystalline rock, Tertiary intrusives, and the Dakota Sandstone,

but some veins are also found in shale units. Major components of the veins are copper, lead, zinc, gold, and silver. Deposits of this type have been mined in the Breckenridge area.

Polymetallic replacement

A small area near Breckenridge has high resource potential for metals in small replacement deposits. Vein deposits are the dominant type but some subsidiary replacement deposits formed where veins intersected favorable rocks (Maroon Formation and Dakota Sandstone).

A number of the tracts include patented mining claims. By virtue of their being patented, these mining claims presumably contained ore-grade locatable mineral deposits at the time of patent. In order to offer a definitive statement regarding their current value, a field examination would be necessary.

SELECTED FEDERAL LANDS FOR EXCHANGE

Fredonia properties **A** and **6**

These properties are in Pleistocene (Pinedale and Bull Lake) glacial drift overlying Pennsylvanian Minturn (gray and red sandstone, grit, and conglomerate; as much as 6,000 ft thick) Formation and related rocks (Tweto, 1974). The tracts are not included in the "productive mineralized area" (Tweto, 1974). Singewald (1951) shows a shaft exposing a stringer of dolomite in Quaternary glacial moraine but does not describe it in the report.

No production is known from this property. The shaft could present a hazard if it is still open. Depending on the type of gravels covering this property, there could be some chance of placer deposits, however, no placer deposits are known on this stretch of the upper Blue River (Parker, 1974). Overall, the resource potential of these properties is low.

Tri-lots **B**

Tract B is underlain by Lower Cretaceous Dakota Sandstone and shale of the Upper Jurassic Morrison Formation adjacent to lower Tertiary and Upper Cretaceous granodiorite and quartz monzonite intrusive porphyries (Tweto, 1974). The bedrock is cut by NE-trending faults (Tweto, 1974). The tract appears to include the Puzzle Extension shaft (Ransome, 1911) which accessed a number of workings. In his description of the area, Ransome (1911, p. 138-140) combines this property with the Puzzle, Ouray, and Gold Dust mines. All had been abandoned prior to 1909. Material from Puzzle-Ouray vein is lead ore containing moderate abundances of silver, some iron, and <8% zinc. It was apparently mined out (Ransome, 1911) but there is moderate potential for a small deposit remaining. This site has potential for high metal contents in drainage waters and should be inspected carefully for potential drainage hazards.

Town of Breckenridge **C**

Tract C is primarily underlain with Upper Jurassic Morrison Formation and Lower Cretaceous Dakota Sandstone. The northernmost part may include lower Tertiary and Upper Cretaceous granodiorite or quartz monzonite intrusive porphyries. The western part may be covered with Pleistocene outwash and terrace gravels. The tract may be cut by several ENE-trending, nearly vertical faults (Lovering, 1934).

This tract appears to at least partly include the Hermit Placer (Ransome, 1911). Less than a dozen small unnamed workings are shown on or near this tract (Lovering, 1934; Ransome, 1911). There are no records of production for these deposits.

Resource potential for lode deposits on this particular tract is low, any gravels should be tested to assess the placer potential.

The slopes should be examined for stability: Morrison Formation is known for landslides, swelling clays, muddy roads, and other hazards.

Town of Breckenridge **D**

Tract D is in Pennsylvanian Minturn Formation (as much as 6000 ft of gray and red sandstone, grit, and conglomerate) and related rocks and Upper Jurassic Morrison Formation and Lower Cretaceous Dakota Sandstone (Tweto, 1974). The bedrock is cut by NE-trending faults (Tweto, 1974).

The Iron Mask mine, low on the NE face of Shock Hill, probably is located on this tract. "From this mine shipments of high-grade silver -lead ore began in 1888 and continued with few interruptions for about 10 years" (Ransome, 1911, p. 18). There are no production records. The mine workings follow a "sinuous vein striking about N50E and dipping southeastward" (Singewald, 1951). Sharp curves in the drift suggest local cross faults (Singewald, 1951). The ore "is said to have occurred above and below a sheet of porphyry...[and] in some places the carbonate ore was accompanied by much free sulphur[...]. Nothing whatever could be seen of the ore bodies in 1909. (Ransome, 1911, p. 161)." Mineral potential of this tract is low.

Agape **E**

Both parts of Tract E are in Holocene and Pleistocene stream and outwash gravels (Tweto, 1973). No mines are known in the area. No placer deposits are known along this stretch of the Blue River (Parker, 1974).

Buffalo Mountain **F**

Geologic maps of tract F differ substantially, presumably due to sparse outcrop and Quaternary deposits concealing bedrock. Parker (1974) mapped the entire tract as high terrace gravel. Tweto (1973) mapped the same area primarily as Tertiary Dry Union Formation (Pliocene and Miocene), cut by a NNW-trending high-angle fault. A small patch of Cretaceous Dakota Sandstone and/or Jurassic Morrison Formation, undifferentiated, is exposed on the west side of the fault. East of the fault, the Dry Union is probably underlain by Pierre Shale (not exposed on the tract), Niobrara Formation, and Benton Shale (Tweto, 1973). A NE-trending fault cutting the Colorado Group rocks immediately east of the tract, probably continues through the tract but is concealed. The slopes should be examined for stability.

No minerals are known to occur on this tract. The historic Buffalo placers were to the south in Salt Lick Creek and Ryan Gulches (Parker, 1974, p. 145). Both placers lacked sufficient water and neither placer produced much gold. Tract F is on the slope north of Ryan Gulch, not in the streambed; thus the placer potential would be low.

Town of Frisco (2 parcels) **G**

Both parts of tract G are mapped as Pleistocene Glacial drift (Tweto, 1973).

No mineral resources known to occur. No placer deposits are known in the vicinity (Parker, 1974).

Summerwood **H**

Tract H is in Cretaceous sedimentary rocks cut by at least one NNE-trending fault. The rocks include the Upper and Lower Cretaceous Colorado Group (Niobrara Formation and Benton Shale)

overlying Lower Cretaceous and Upper Jurassic Dakota and Morrison Formation, undivided (Tweto, 1973). The slopes should be examined for stability.

No mineral resources are known to occur.

Soda Creek **I**

Tract I is mapped as Upper and Lower Cretaceous Colorado Group Niobrara Formation and Benton Shale. It is cut by a NW-trending fault dropped down on the southwest. (Tweto, 1973).

A generalized mineral potential map (Toth and others, 1993) includes this tract at the edge of an area assigned moderate potential for polymetallic veins, however no mineral resources are known to occur on this property. The slopes should be examined for stability.

United Church of Christ **J**

Tract J appears to be on an ENE-trending fault in Tertiary/Cretaceous intrusive porphyry. The porphyry intrudes Cretaceous Dakota Sandstone and Jurassic Morrison Formation (and perhaps Pennsylvanian Minturn Formation) unconformably overlying Archean biotite gneiss and migmatite (Tweto, 1973). The bedrock may be covered with Holocene and Pleistocene stream and outwash gravels.

This tract is included at the edge of an area that was assigned high placer potential and moderate potential for polymetallic veins (Toth and others, 1993). However, no mineral resources nor placers (Parker, 1974) are known to occur here.

Pebble Creek **K**

Tract K is located on the south side of Pebble Creek. It is mapped as Pliocene or Miocene Dry Union Formation overlain by Pleistocene glacial drift (Tweto, 1973).

No mineral resources are known to occur.

Hill **L**

Tract L is underlain by Cretaceous Dakota Sandstone, Colorado Group, and Pierre Shale overlain by Pleistocene glacial drift. It is in an area of repeated section along NNW-trending faults, dropped down to the northeast (Tweto, 1973). Slopes should be examined for stability.

No mineral resources are known to occur.

Triple Creek Ranch **M**

Geology of tract M is very similar to tract L. It is almost entirely Pleistocene glacial drift overlying Cretaceous sedimentary rocks and is likely to be faulted (Tweto, 1973). The slopes should be examined for stability.

No mineral resources are known to occur.

Pioneer Creek **N**

Tract N is almost entirely in Cretaceous Colorado Group (Niobrara Formation and Benton Shale) cut by NNW-trending faults that dropped down to the east. Some stratigraphically underlying Dakota Formation topographically above (Tweto, 1973). Slopes should be examined for stability.

No mineral resources are known to occur.

Oxbow Ranch **O**

Tract O is in Upper Cretaceous Pierre Shale overlain by Pleistocene glacial drift (Tweto, 1973). Pierre Shale is commonly associated with unstable slopes and muddy roads.

No mineral resources are known to occur.

Mt Powell **P**

Tract P is underlain by Holocene and Pleistocene alluvium, outwash, terrace, and pediment gravels (Tweto and Reed, 1973).

No mineral resources are known to occur.

Mt Powell/Gary **Q**

Tract Q is in Quaternary glacial drift overlying Cretaceous Pierre Shale (Tweto and Reed, 1973).

No mineral resources are known to occur.

Mt Powell/Palmer's Knob **R**

Tract R is in a faulted area of clay, sand, and gravel of the Miocene Troublesome Formation overlying Upper Cretaceous Pierre Shale (Tweto and Reed, 1973). The slopes should be examined for stability.

No mineral resources are known to occur.

Horse Barn **T**

Tract T is in Quaternary alluvium in the flood plain (Tweto and Reed, 1973).

No mineral resources are known to occur.

SELECTED FEDERAL LANDS FOR EXCHANGE

Slate Creek **1**

Pierre Shale underlies Quaternary glacial drift and landslide material (Tweto and Reed, 1973) on Tract 1. This tract should be examined for landslide potential.

No mineral resources are known to occur.

North Tenmile **2**

Tract 2 is entirely within Archean biotite gneiss and migmatite. It may be cut by NNE-trending faults, especially at the west end (Tweto, 1973).

The property is about one-half mile south of two unnamed and undocumented mines. No records of production are available.

The tract is in an area assigned high potential for small polymetallic vein deposits (Toth and others, 1993) but no mineral resources are known to occur.

Bemrose Ski Circus **3**

Tract 3 is on the north side of Hoosier Pass. It is underlain by Pennsylvanian Minturn (gray and red sandstone, grit, and conglomerate; as much as 6,000 ft thick) and Belden (black shale and limestone; 500 ft thick) Formations (Tweto, 1974). In the northeast part of the tract, a north-trending fault places Paleozoic rocks on the west against lower Tertiary and upper Cretaceous granodiorite and quartz monzonite intrusive porphyries on the east. The tract is partially covered with Pleistocene glacial drift (Tweto, 1974).

The entire tract is in "productive mineralized area" (Tweto, 1974) and includes the Bemrose mine (Wilson and LaRock, 1992; Singewald, 1951, p. 47-49). The Bemrose mine included a 170 ft shaft and two levels of workings (Singewald, 1951). It is a replacement deposit conformable with bedding. The "vein is essentially continuous but the ore shoots are irregular kidney-shaped bodies containing several hundred pounds to several carloads [of ore] each" (Singewald, 1951). Ore is fine-grained pyrrhotite and pyrite with scant gangue of dolomite and quartz; there are minor pockets of dark sphalerite

and galena. Gold is associated with coarser-grained pyrite. No records of production are available but the mine probably produced gold ore and some iron; the total value was not more than "a few tens of thousands of dollars (Singewald, 1951).

Singewald (1951) suggests the ore shoot could continue to the north. There is no mention of whether the ore continues to the south. Based on its small size, production history, and location, it is unlikely that the mine could produce enough ore to be profitable in the foreseeable future. The site should be examined for metal rich drainage and for acid mine drainage because of the high pyrite content.

Parker (1974) describes the Bemrose and Bostwick placer near the center of section 12, which may be on this tract. "The Bemrose placers lie on the northern margin of a mass of till shoved over Hoosier Pass by the Platte Gulch glacier and in outwash material from it" (Parker, 1974, p. 176). The gravels are less than 20 ft thick. There is no information available about the nature of the gold produced. Parker (1974, p. 177) summarizes:

> The reserves of gravel remaining to be mined are probably small. [...] prevention of water pollution is particularly essential at these placers. The ground is too steep for dredging or even ordinary dry-land mining methods, so that mining of any scale requires hydraulic methods. However, water is not available for hydraulicking at these high placers during much of the placer season, and the pollution problems presented by that method are almost insurmountable.

Parkville 4

Tract 4 is on the north slope of Farncomb Hill and includes at least some of the properties included in the eastern part of the Wapiti Group (Ransome, 1911). Wapiti group workings are on the American placer claim (a.k.a. Fuller &Greenleaf placer No. 85), which was patented before the veins were discovered (Ransome, 1911, p. 155). Mine workings that may be on this tract are the Fair Tunnel, Gold Flake, Bondholder, and Fountain (Wilson and LaRock, 1992). The workings access rich, narrow, NE-trending gold veins which, by 1909, although worked by "perhaps half a dozen men" were "virtually exhausted" (Ransome, 1911).

The tract is mapped mostly as upper Cretaceous Shale (Ransome, 1911), which probably corresponds with the Colorado Group (Niobrara Formation and Benton Shale). In American and Georgia gulches the dark shale beds are covered with loose material, unmapped, some of which was washed by placer miners (Ransome, 1911). The Swan River valley is filled with Quaternary moraines and alluvium.

Farncomb Hill veins are regular and persistent. They are remarkably narrow, rarely more than ½ inch wide, yet extend for hundreds of feet. The veins cut the bedding of the shale and pass through porphyry sills without being deflected. Known sulfides include pyrite, chalcopyrite, sphalerite, and galena. Crystalline native gold has been found embedded in calcite, sphalerite, or galena. Pockets of native gold are related to small faults that dislocate the veins and to the porphyry sills within about 300 ft of the main porphyry body. Gold has been found in veins where they cross thin sheets of porphyry in the shales but not within the main body of porphyry (Ransome, 1911).

Between 1837 and 1933, which brackets the production for this district, the price of gold was fixed at $20.67/oz. As of 1911, several months work of several lessees might be required to find a small pocket yielding $1000-4000 (Ransome, 1911) or about 50-200 ounces. In today's (1997) economy, this translates to $20,000 - 80,000, which is probably sub-economic.

Gravels in American and Georgia Gulches and into Swan River could be reworked (Toth and others, 1993) -- analyses of gold content, if any, of the gravels are not available.

Heeney Cutoff River Access **5**

Tract 5 is underlain by Pierre Shale and Quaternary alluvium. It is covered in the northwest by landslide material (Tweto and Reed, 1973).

No mineral resources are known to occur.

Fredonia **6**

(See Fredonia properties A and 6, above)

Blue River Access **7**

Tract 7 is underlain by Colorado Group (Niobrara and Benton Shale) and is at least partly covered with Quaternary alluvium. The tract follows a concealed NW-trending fault zone that is dropped down to the east (Tweto and Reed, 1973). The slopes should be examined for stability.

No mineral resources are known to occur.

SUMMARY:

With few exceptions, the mineral resource potential of most of these tracts is low. Most tracts should be examined for slope stability and gravels should be tested for gold content.

Tract A's shaft could present a hazard if it is open. The mineral potential is low.

Tract B has moderate mineral potential for a small deposit. It has high potential for elevated metal content in drainage waters.

Tract C has low mineral potential, gravels should be tested, slopes should be examined for stability.

Tract D has low mineral potential remaining.

Tract E has low mineral potential.

Tract F has low mineral potential but slopes should be examined for stability.

Tract G has low mineral potential.

Tract H has low mineral potential but slopes should be examined for stability.

Tract I has low mineral potential but slopes should be examined for stability.

Tract J has low mineral potential.

Tract K has low mineral potential.

Tract L has low mineral potential but slopes should be examined for stability.

Tract M has low mineral potential but slopes should be examined for stability.

Tract N has low mineral potential but slopes should be examined for stability.

Tract O has low mineral potential but slopes should be examined for stability.

Tract P has low mineral potential.

Tract Q has low mineral potential.

Tract R has low mineral potential but slopes should be examined for stability.

Tract T has low mineral potential.

Tract 1 has low mineral potential. Slopes should be examined for landslide hazards.

Tract 2 is within an area assigned high mineral potential for polymetallic veins, however there is no indication of any mineralization on this particular property. The site should be examined.

Tract 3 has moderate potential for small polymetallic replacement deposits. It also should be examined for metal rich drainage and acid mine drainage. Gravels may contain gold but mining them is unlikely due to lack of water and environmental considerations.

Tract 4 has high potential for existing polymetallic vein deposits but these are unlikely to be economic in the foreseeable future. Gravels in the northern part of the property should be tested for their gold content. Any drainage should be checked for elevated metal content or acidity.

Tract 5 has low mineral potential. Slopes should be examined for landslide hazards.

Tract 6's shaft could present a hazard if it is open. The mineral potential is low.

Tract 7 has low mineral potential but slopes should be examined for stability.

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LOCATABLE MINERAL REPORT FOR THE
WINTER PARK PROPERTIES (RAINTREE) LAND EXCHANGE OFFER,
ARAPAHO AND ROOSEVELT NATIONAL FORESTS
GRAND AND BOULDER COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

August 27, 1996

EXHIBIT "A": Property that Winter Park Properties (Raintree Exchange) shall consider exchanging:

T1S, R74W 276 acres
Section 2: as described
Additional Lands if needed: (No map provided. These lands not evaluated in this report.)
T?S, R89 W: Secs. 5, 6, and 7
T9S, R89 W: Secs. 31, 32, or 33 (Mid-Continent Coal Basin Property)

The host rock is primarily Boulder Creek Granodiorite (~1.66 Ga) that intruded 1.7-1.77 Ga biotite gneiss, exposed in the northwestern part of the parcel (Young, 1991). The valley is filled with Quaternary glacial deposits--unconsolidated boulders, sand, and gravel. A large northwest-trending fault, the Arapaho Pass fault, on the north side of the North Fork of Middle Boulder Creek is mineralized, and hosts several deposits. A mineral resource appraisal of the adjacent Indian Peaks Wilderness Study area (Pearson, 1980) reveals no signs of mineralization on this parcel.

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

T2S, R75W 37.2 acres
Sec. 10: Portion of E 1/2 E 1/2 SE 1/4
Sec. 11: Portion of W 1/2 W 1/2 SW 1/4

Unpublished mapping by P.K. Theobald (USGS) of the geology of the Fraser 7 1/2-minute quadrangle shows Precambrian pegmatite in the northwestern part and Precambrian mylonite in the northeastern part of the Winter Park property in Sec. 10/11. The remainder of the property is covered with Quaternary glacial moraines. The pegmatite is muscovite-bearing but the muscovite is sheared by a late stage deformation (P.K. Theobald, oral communication, August 26, 1996). Consequently, the resource potential of this tract is low. No mines, prospects, claims, or other indications of previous mineral activity appear in any of the literature (or maps) of this area.

REFERENCES:

Colorado Geological Survey, 1991, Oil and gas fields map of Colorado: Colorado Geological Survey Map Series 26, scale 1:500,000.

Streufert, R.K., and Cappa, J.A., 1994, Location map and descriptions of metal occurrences in Colorado with notes on economic potential: Colorado Geological Survey Map Series 28, scale 1:500,000.

Davis, M.W., and Streufert, R.K., 1990, Gold occurrences of Colorado: Colorado Geological Survey Resource Series 28, 101 p.

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Theobald, P.K. 1960's, unpublished mapping, scale 1:24,000.

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LOCATABLE MINERAL REPORT FOR THE
MOUNTAIN COAL COMPANY LAND EXCHANGE OFFER,
GUNNISON AND WHITE RIVER NATIONAL FORESTS,
GUNNISON COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

December 30, 1996
revised January 15, 1997

EXHIBIT "A": Property that U.S. Forest Service shall consider exchanging:

Sylvester Gulch

T13S,R90W, 6th Principal Meridian, Colorado:
Secs. 21 and 22: 836.41 acres

EXHIBIT "B": Property that Mountain Coal Company shall consider exchanging:

Bear Property

T12S, R88W, 6th Principal Meridian, Colorado
Secs. 19,20,29. 280 acres

Marble Mining Claims

T11S, R87W, 6th Principal Meridian, Colorado
(note: the numbers 1-6 on the location map do not correspond with those in USFS exhibit B)

Tract 1 = May	10.33
Tract 2 = Climax	10.33
Tract 3 = Monitor, Vermont, and Marble placers	157.43
Tract 4 = Silver King, Silver Tip, Silver Tip #2, Lyons, Island Belle, and McKee	26.66
Tract 5 = Brooklyn, and Silver Crown	30.79
Tract 6 = Rascal Marble placer	17.70
	Approximately 376 acres

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS/MILS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Sylvester Gulch area: Offered Federal Land

Geology of this tract is primarily Cretaceous Mesaverde Formation overlain in the southern part of the property by unconsolidated Pleistocene deposits. A high angle, north-northeast trending fault, down dropped on the east, divides the area on either side of Sylvester Creek nearly along the section line. Three exploratory drill holes are in Sylvester Creek (Ellis and others, 1987). A map of the Somerset Coal Field (Dyni and Gaskill, 1980) shows neither the fault nor the drill holes. The mine shown at the corner of secs. 21 and 22 is probably the Mt. Gunnison No. 1 Mine (owned by the West Elk Coal Company, thus the "West Elk Mine" label on the USFS topographic map), recorded in the MAS/MILS database as being in Sec. 16.

The MAS/MILS database includes 8 coal properties in the Somerset quadrangle: Bear Mine, Hawks Nest #3, Somerset and O.C. Mines (at the same location), Paonia Coal drilling project (several miles south of the land exchange area), Somerset B and C Seams, Mt. Gunnison #1 mine, and an Unknown mine west of the town of Somerset. These mines appear to be associated with the lower part of the Mesaverde Formation. The MAS/MILS database contains considerable information about the Mt. Gunnison #1 mine, much of which is proprietary.

Although the map in Dyni and Gaskill (1980) shows the Clark, Oliver, and Hawknest (not to be confused with the Hawks Nest #3) mines to be coal mines, these properties, along with the Axelson and Hubbard mines are listed in the MILS/MAS database as past producers of gold-silver-lead-zinc. Additionally, copper is listed for the Axelson mine. No descriptions of these deposits could be located. Presumably these metals are associated with unmapped intrusive bodies related to the Oligocene age laccoliths and sills that crop out to the east.

On the basis of maps and sketchy reports, the potential for discovering coal on (or under) this property is high. Site visits to the metallic mines and detailed mapping of the proposed land exchange area are recommended before evaluating the potential for metallic minerals on this property.

The Bear Property: Offered Non-Federal Land

Geology of the eastern part of this tract is shown the geologic map of the Marcellina Mountain quadrangle (Gaskill and Godwin, 1966a). No detailed mapping is available for the western part of the tract (Paonia Reservoir 7 ½' quadrangle), but a simplified map of the region (Dyni and Gaskill, 1980) shows Mancos Shale overlain by Mesaverde Formation on the flank of the Ragged Mountain laccolith.

According to the Gaskill and Godwin (1966a) map, the land exchange area is underlain by the upper member of the Cretaceous Mancos Shale, here a dark-gray, laminated, silty marine shale about 4,300 ft thick. The upper part of the Mancos Shale intertongues with the 40-170 ft thick basal sandstone unit of the Mesaverde Formation. It is overlain by about 50-190 ft of dark gray marine shale, a second sandstone unit, 80-130 ft thick, and then by more interbedded sandstone, shale, and carbonaceous shale, and a few thin beds of coal to make a total Mesaverde Formation package about 1,800 ft thick.

The sedimentary rocks were intruded in late Eocene or later, by the Ragged Mountain laccolith, a light-gray, quartz monzonite porphyry. A granodiorite or granodiorite porphyry sill or dike intrudes the Mesaverde Formation in, or close to, the southeast corner of the land exchange area.

Both Gaskill and Godwin (1966a) and Dyni and Gaskill (1980) show northwest trending high-angle faults, within the Mesaverde Formation, that are down dropped on the southwest. No mines or prospects are shown in the immediate area in the MRDS or MAS/MILS databases. The area proposed for exchange is outside the boundaries of any known mineralized districts. The land exchange area is on the margin of the Raggeds Wilderness area (Kness, 1984) and no deposits are in the immediate vicinity. Several oil and gas leases are as close as 1-2 mi to the west and there are coal leases about 2 mi to the southwest.

Mineral resource potential for metals in this tract is low. Because of its proximity to the laccolith, potential for coal, oil, and gas are also low.

Marble Claims area: Offered Non-Federal Land

[Claim names and numbers used here are from the maps by Vanderwilt (1937) and Gaskill and Godwin (1966a), and may be different than those used in the legal description, above.]

All the tracts in this offering are on patented mineral claims. The claim names given on the FS legal descriptions vary slightly from those on the Vanderwilt (1937) map. However, there are discrepancies with the number of the tracts on the map of the Marble claims and the legal description in exhibit B. The tract numbers below refer to the numbers on the colored photocopies of the geologic maps provided to the U.S. Forest Service. BEWARE!

1. May lode follows a quartz vein in Dakota Sandstone. The vein strikes NW and dips about 60° NE. The May (Pioneer [Warrior] tunnel) mine (Gaskill and Godwin, 1966b, # 4; Vanderwilt, 1937, claim 113 and mine #11) may be about one claim's width to the northeast. It is described as a prospect with "very few sulphides others than pyrite" (Vanderwilt, 1937, p. 123). No production is mentioned.
2. Climax lode (Vanderwilt, 1937, claim 190) follows a NW-trending quartz vein in the lower member of the Mancos Shale. Part of the claim is covered with landslide deposits (Gaskill and Godwin, 1966b, #7). There is no record of production from this claim.
3. The Monitor, Vermont, and Marble placer claims are underlain by Pennsylvanian Minturn Formation which is unconformably overlain by Upper Jurassic Entrada Sandstone. The rocks are locally covered with Quaternary alluvium and talus deposits. Prince of Wales is a lode claim along the Jurassic Entrada Sandstone and Morrison Formation contact. It is included in the outline of the Lizard Lake--Lost Trail Creek mineralized area (Kness, 1984, p. 27), but no geochemical samples were collected or reported for the claims in this tract. (Prince of Wales is not listed in the USFS legal description, but the shape of the tract outlined on the Marble claims map seems to include this claim (as shown by Vanderwilt, 1937, claims 26-29)). There is no record of production from claims in this tract.
4. The Silver Tip tract (Vanderwilt, 1937, claims 138, 140, 143, 156, 157, 164; the Silver King, Silver Tip, Lyons, Silver Tip No. 2, Island Belle, and McKee, respectively) is along the contact of the granite of the Treasure Mountain Stock where it intrudes the Pennsylvanian Belden and Maroon Formations (Gaskill and Godwin, 1966b; Mutschler, 1970). No mines appear to have been located on, nor minerals produced from, this tract. These claims are located downslope from, and south of, the Black Eagle mine which shipped a single "small carload" of silver ore in 1894 (Vanderwilt, 1937, p. 115). The southeastern end of this claim block is near the Black Queen, and Evening Star mines. Small amounts of gold and silver were reportedly produced from the Black Queen: no production is reported from the Evening Star (Vanderwilt, 1937, p. 115-117).
5. The Brooklyn and Silver Crown tract (Vanderwilt, 1937, claims 124 and 125) is in the Pennsylvanian Minturn Formation and possibly in the underlying Belden Formation. The tract may include the Catalapa (a.k.a. Catalpha) -Tennessee "mine". Vanderwilt (1937, p. 117) found "no sulphides" in the Catalpa mine, but noted that there were warm waters

with high calcium-carbonate content. This is of interest, not only because of the warm water, but also because the calcium carbonate would buffer any sulfides that might otherwise generate acid waters. When Vanderwilt (1937, p. 125) visited the Tennessee property "nothing could be learned about the deposit beyond the fact that the sulfides common in the area were present". He reports assay values from dump material, but production was recorded.

6. The Rascal Marble Placer (Vanderwilt, 1937, claim 135) is on a steep slope underlain by the entire rock unit sequence of Cambrian Swatch quartzite through Pennsylvanian Belden Formation and intruded by granite of the Treasure Mountain stock. There is no record of production from this tract.

At a scale of 1:250,000, Toth and others (1993), designated this area as having mineral potential for six different deposit types. The area was assessed to have:

Potential	Deposit Type
moderate	stockwork molybdenum
low	polymetallic skarn
moderate to high	polymetallic replacement
high	polymetallic vein
low	sandstone uranium-vanadium
moderate	high-calcium limestone.

However, on a claim-by-claim basis, the potential is significantly less.

SUMMARY:

Sylvester Gulch: This property has high potential for the discovery of additional coal. It is adjacent to West Elk Coal Company's Mt. Gunnison #1 mine, and is a logical place for an extension. There have been no additions to the records since 1986, the mine may be inoperative. Metallic mineral resources have been reported from mines in the area. However, insufficient information is currently available to assess the locatable resource potential of the Sylvester Gulch tract.

Bear Property: Potential for mineral resources in this tract is low.

Marble Mining Claims: Although there is considerable resource potential in this mining district in general, the likelihood of mineral deposits occurring on these particular claims is relatively low.

REFERENCES:

Dyni, J.R., and Gaskill, D.L., 1980, Relation of the Carbon/Oxygen ratio in coal to igneous intrusions in the Somerset coal field, Colorado: U.S. Geological Survey Bulletin 1477-A, 20 p., scale 1:100,000.

Ellis, M.S., Gaskill, D.L., and Dunrud, C.R., 1987, Geologic map of the Paonia and Gunnison area, Delta and Gunnison Counties, Colorado: U.S. Geological Survey Coal Investigations Map C-109, scale 1:100,000.

Gaskill, D.L., and Godwin, L.H., 1966a, , Geologic map of the Marcellina Mountain quadrangle, Gunnison County, Colorado: U.S. Geological Survey Geological Quadrangle Map GQ-511, scale 1:24,000.

Gaskill, D.L., and Godwin, L.H., 1966b, Geologic map of the Marble quadrangle, Gunnison and Pitkin Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-512, scale 1:24,000.

Kness, R.F., 1984, Mineral investigation of the Raggeds Wilderness area, Gunnison County, Colorado: U.S. Bureau of Mines MLA Report 21-84, 83 p.

Mutschler, F.E., 1970, Geologic map of the Snowmass Mountain quadrangle, Pitkin and Gunnison Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-853, scale 1:24,000.

Toth, M.I., Wilson, A.B., Cookro, T.M., Bankey, Viki, Lee, Greg, Case, J.E., and Dersch, J.S., 1993, Mineral resource potential and geology of the White River National Forest and the Dillon Ranger District of the Arapaho National Forest, Colorado: U.S. Geological Survey Bulletin 2035, 117 p., scale 1:250,000.

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The following rock unit descriptions, pertaining to the Bear Property, are paraphrased from the geologic map of the Marcellina Mountain quadrangle (Gaskill and Godwin, 1966a). A photocopy of the map is attached.

qmp: quartz monzonite porphyry. Light-gray porphyritic laccolith [southern end of the Ragged Mountain laccolith] that consists of phenocrysts of zoned plagioclase, biotite, hornblende, and partly digested quartz in a microcrystalline to fine-grained granular matrix of quartz and alkalic feldspar. Generally contains large phenocrysts of pink orthoclase. Includes gradational rocks intermediate in composition between quartz monzonite and granodiorite porphyry.

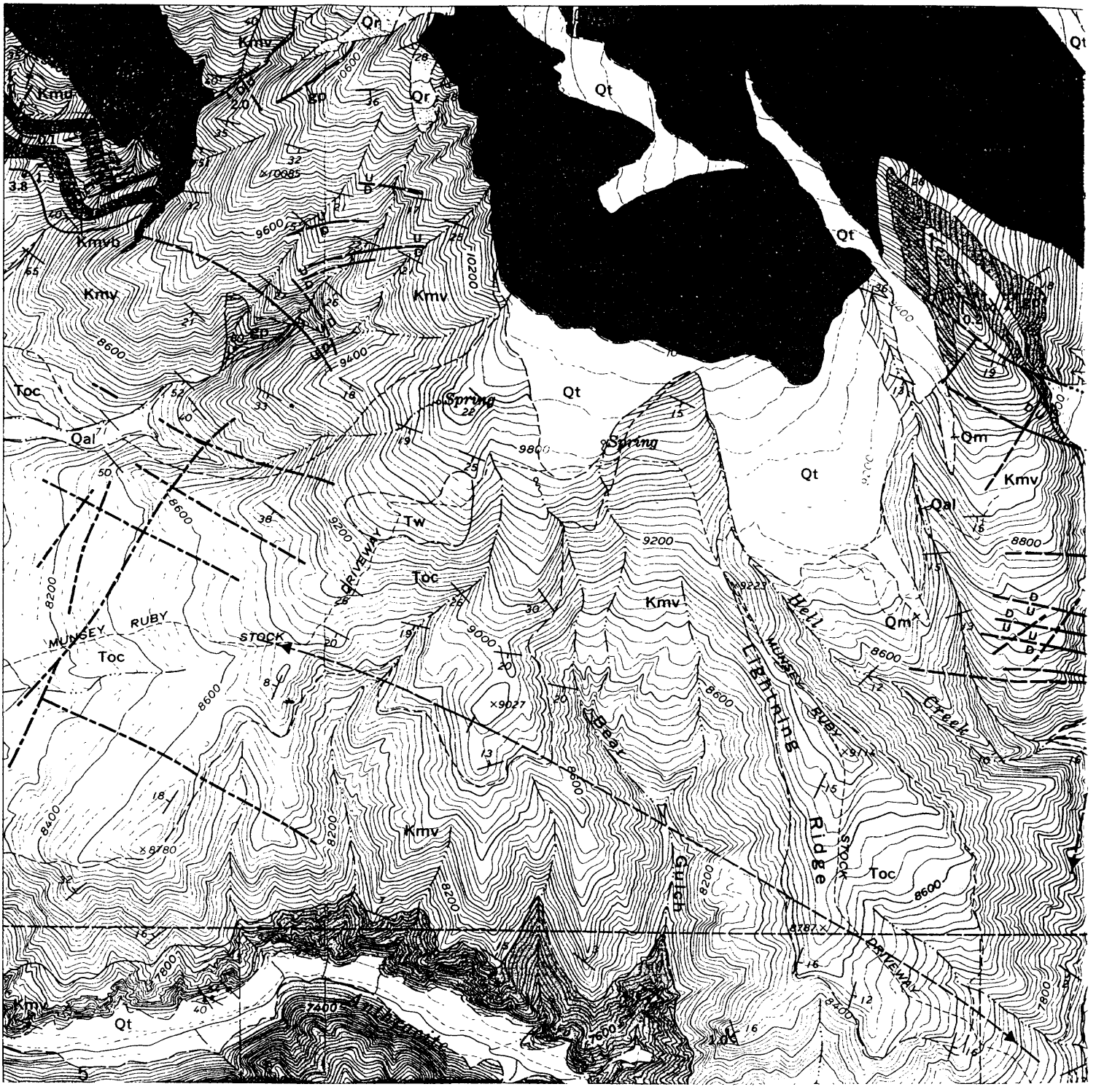
gp: granodiorite and granodiorite porphyry. Light-gray porphyritic sill (or dike) that consists of zoned plagioclase, hornblende, and biotite phenocrysts, in a graphic intergrowth of quartz and alkalic feldspar. Phenocrysts are about twice the grain size of the groundmass. Quartz phenocrysts are generally not visible in hand specimen. Ranges in composition from granodiorite to quartz monzonite.

Kmv: Mesaverde formation (about 1,800 ft). Interbedded sandstone, shale, and carbonaceous shale. Locally a few thin beds of coal.

Kmvb: Second sandstone unit (80-130 ft). Medium-gray to white thick-bedded massive fine- to medium-grained sandstone separated from Kmva by 150-190 ft of dark-gray marine shale.

Kmva: Basal sandstone unit (40-170 ft). Medium-gray to white thick-bedded massive fine- to medium-grained sandstone unit; intertongues with upper member of Mancos Shale.

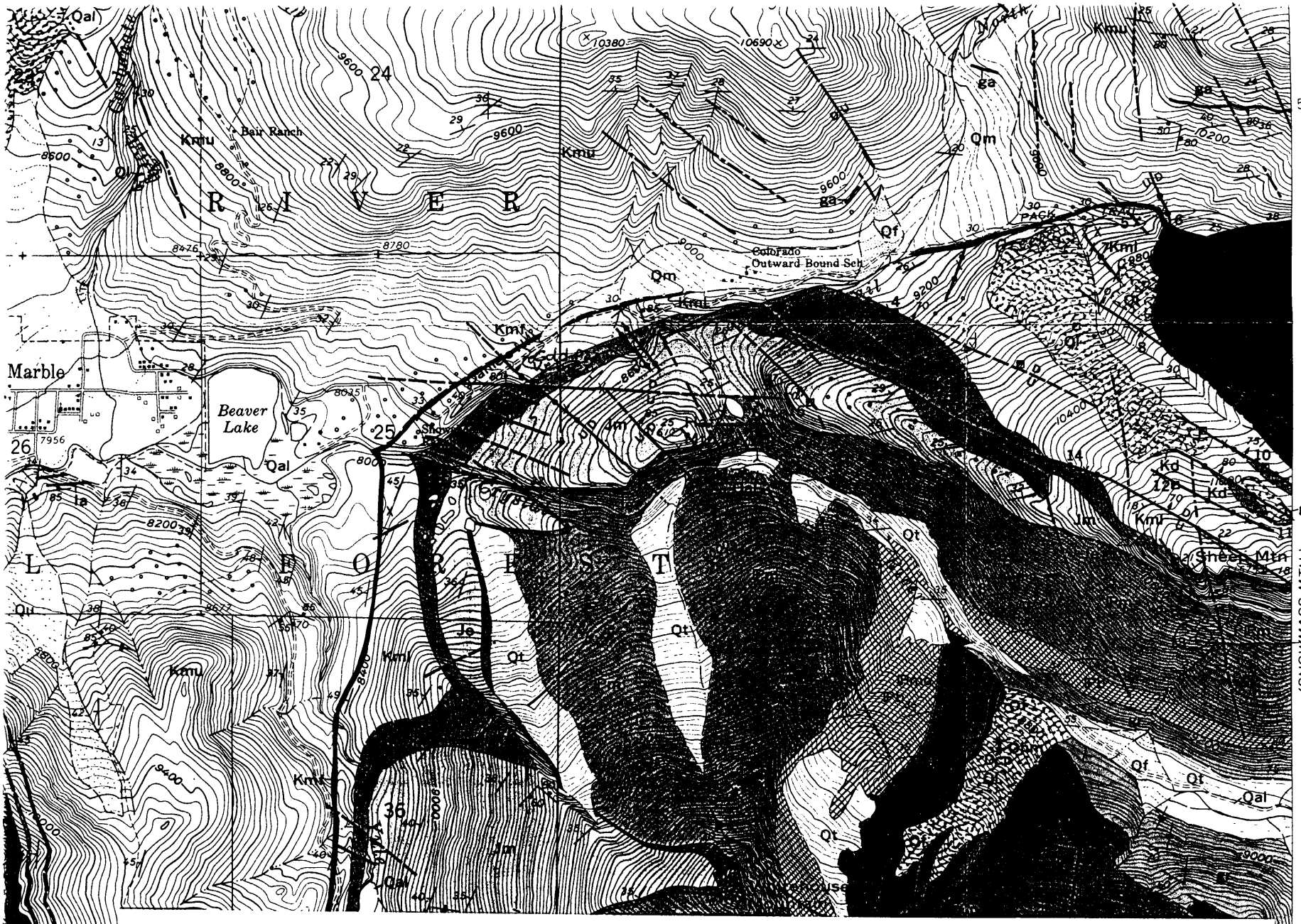
Kmu - Upper member of Mancos Shale (about 4,300 ft). Dark-gray laminated silty marine shale, locally indurated; prominent sandy zone (about 700 ft thick) 2,000 ft above base. Thin to thick beds of silty sandstone, sandy limestone, and carbonaceous shale in transition zone below lowest massive sandstone unit (Kmva) of the Mesaverde Formation. Lower 700 ft is gray calcareous shale.



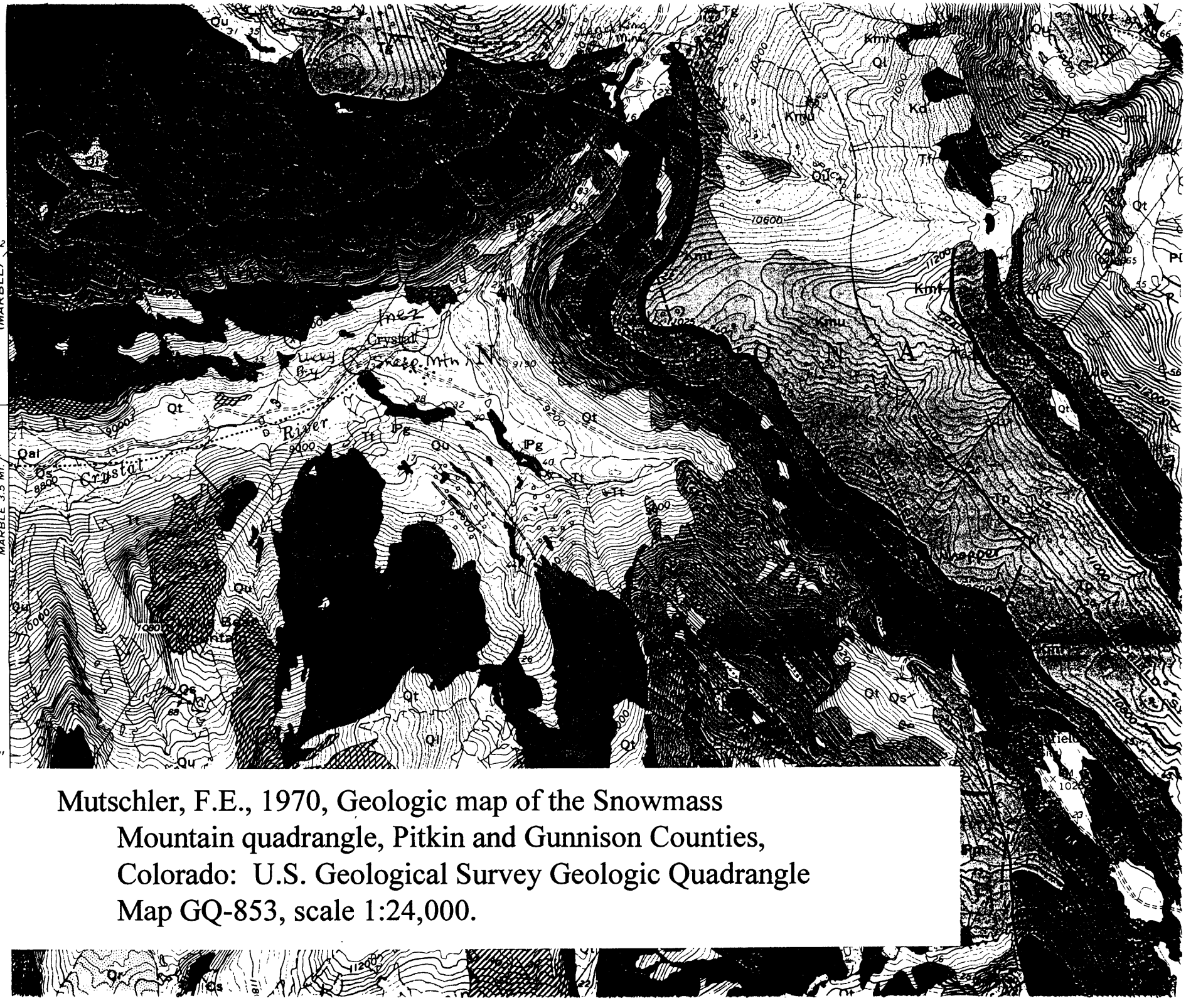
Gaskill, D.L., and Godwin, L.H., 1966a, , Geologic map of the Marcellina Mountain quadrangle, Gunnison County, Colorado: U.S. Geological Survey Geological Quadrangle Map GQ-511, scale 1:24,000.

The following rock units and the tracts numbers to which they apply are from the geologic map of the Marble (Gaskill and Godwin, 1966b) and Snowmass Mountain(Mutschler, 1970) quadrangles. A photocopy of each map is attached. Detailed map unit descriptions are on the maps.

Qal: Alluvium and pond deposits (tract 3)
Qt: Talus deposits (tracts 3, 4, 5, 6)
Qf: Alluvial fan and cone deposits (tract 4)
Ql: Landslide deposits and slump blocks (tracts 2, 6)
gr: Granite porphyry. White to pink porphyritic granite in Treasure Mountain dome (tracts 4, 6)
Kmf: Fort Hays Limestone Member of Mancos Shale. Dense fossiliferous limestone, shaly limestone, and limy shale (tract 2)
Kml: Lower Member of Mancos Shale. Gray shales; variously calcareous, siliceous, fissile, or indurated (tract 1(?), 2)
Kd: Dakota Sandstone. Gray to white quartzite, conglomeratic at base (tract 1)
Jm: Morrison Formation. Varicolored siltstone, shale and marlstone (tracts 1(?), 3)
Je: Entrada Sandstone. Cross-bedded sandstone (tract 3)
Pm: Minturn Formation. Gray, arkosic sandstone; containing quartz and feldspar pebbles (tracts 3, 4, 5, 6)
Pb: Belden Formation. Gray sandy, cherty limestone, dolomitic limestone, dolomite, calcareous sandy siltstone and sandstone (tracts 4, 6)
Pmo: Molas Formation. Black argillite grading upward into argillaceous sandstone and siltstone. Lower part is reworked nodules, pebbles, chert, and quartzite on karst surface of Leadville Limestone (tract 6)
Ml: Leadville Limestone. Crystalline marble, dolomite marble, dolomitic limestone (tract 6)
Dcd and **Dcp**: Chaffee Formation. Sandy dolomite and limestone overlying gray quartzite that caps limestone and dolomite with partings of greenish-gray shale and siltstone (tract 6)
Of: Fremont Limestone. Limestone and dolomitic limestone (tract 6)
Ohm: Harding Quartzite and Manitou Formation, undifferentiated. Sandstone, siltstone, or shale, overlying sandy dolomite, limestone, and dolomitic limestone (tract 6)
Cp: Peerless Formation. Quartzite interbedded with limestone, dolomitic limestone, shale, and arkosic quartzite (tract 6, covered by landslide material, Ql)
Cs: Sawatch Quartzite. White to pinkish-gray quartzite (tract 6)



Gaskill, D.L., and Godwin, L.H., 1966b, Geologic map of the Marble quadrangle, Gunnison and Pitkin Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-512, scale 1:24,000.



Mutschler, F.E., 1970, Geologic map of the Snowmass Mountain quadrangle, Pitkin and Gunnison Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-853, scale 1:24,000.

LOCATABLE MINERAL REPORT FOR THE
LAND USE RESOURCE CENTER LAND EXCHANGE OFFER,
PIKE NATIONAL FOREST,
DOUGLAS AND PARK COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

September 5, 1997

EXHIBIT A: Property that Land Use Resource Center will consider exchanging:

	acres:
Hickle: NE1/4 of SE 1/4 Sec. 4, T6S, R75W, Park County (Montezuma 24K)	40
Seventh Day: parts of Secs. 22, 27, and 34, T7S, R69W, Douglas County (Kassler 24K)	480
Falkenberg: parts of Sec 29, T7S, R69W, Douglas County (Platte Canyon 24K)	105
Acreage Land Use Resource Center will consider exchanging:	**625**

EXHIBIT B: Property that the U.S. Forest Service will consider exchanging:

Insmont: SW 1/4 of SE 1/4, Sec. 33, T7S, R72W, Park County (Bailey 24K) <<<Possible error in location: Exhibit B, as provided, states T6S>>>	40
Echo Valley: SW 1/4 of NW 1/4, Sec. 12, T8S, R72W, Park County (Windy Peak 24K)	40
Pine Nook: Lots 1,2,4,5,6, sec. 11, T8S, R69W, Douglas County (Kassler and Devils Head 24K)	approx. 300
Acreage U.S. Forest Service will consider exchanging:	**approx. 380**
Total acreage	approx. 1005

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

NON-FEDERAL LANDS

Hickle
(Park Co., Montezuma 24K)

The Hickle property is between Kirby Gulch and Geneva Creek east of Landslide Peak. The area is mapped as 1.7 Ga Idaho Springs Formation intruded by 1.4 Ga Silver Plume Granite (Lovering, 1935; see attached map). Small Proterozoic pegmatite pods are present in the area (Lovering, 1935).

No mines, prospects, or occurrences are known on the tract (Lovering and Goddard, 1950; U.S. Geological Survey, 1997a, b) yet it is only a couple of miles east of an area assigned high potential for Au, Ag, Cu, Pb, Zn, As, Sb, and Bi in veins (Toth and others, 1993) in the Montezuma district. There is no indication from currently available mapping to suggest the property could be mineralized but because the geology is similar to that near Montezuma and Silver Plume, mineral potential is expected to be moderate. The probability of there being a minable deposit on the property is low.

Seventh Day
(Douglas Co., Kassler 24K)

The Seventh Day property is on east side of Stevens Gulch and Bear Creek Fault in Precambrian granite gneiss and migmatite (Scott, 1963). A few stringers of Precambrian amphibolite, gneissic granite, and hornblende granite gneiss trend northwest. One small granite pegmatite is exposed in the northern part of the tract and a small body of lime silicate gneiss is exposed in the southeast corner. A single Cretaceous andesite dike and several Laramide faults appear to follow the same trend (Scott, 1963).

Mica in slightly iron-stained and warped 4-inch books was prospected on this tract in the SE1/4SW1/4 Sec. 22 (Scott, 1963, p. 114). It isn't known if this prospect is large enough to be mined. Close by, in the SW1/4 SW1/4, a 10-foot shaft along the fault (see attached map) explored a copper prospect with "copper content approach[ing] that necessary for an ore deposit" (Scott, 1963, p. 116). Radiation above background along the Bear Creek Fault could indicate presence of uranium but no uranium minerals have been found in this area (Scott, 1963, p. 116).

Mineral potential of this tract is moderate. It is possible that there are small mica- and/or feldspar-bearing pegmatites, copper in veins or disseminated near faults in lime silicate gneiss and amphibolite, and uranium. To date, exploration in this area has not revealed any minable deposits (Scott, 1963).

Falkenberg
(Douglas Co., Platte Canyon 24K)

The Falkenberg property is entirely within Precambrian migmatite, composed mostly of interlayered biotite gneiss and granitic rocks, and cut by an inferred northwest-trending Laramide fault (Peterson, 1964).

The only mineral deposits in this quadrangle include a rock quarry in the Pikes Peak Granite and several pegmatites near Raleigh Peak that were mined for feldspar (Peterson, 1964, p. C22). No mines, prospects, or occurrences are known on the Falkenberg property. Mineral potential for this tract is low.

FEDERAL LANDS

Insmont (located in T7S, not T6S, as stated in original exhibit B)
(Park Co., Bailey 24K, Bailey 100K, Denver 250K)

1.75 Ga biotite gneiss (unit Xb on attached map) underlies the tract on the north slope of Insmont Hill (Bryant, 1976). Northwest-trending Laramide faults may just cross the northeast and southwest corners of the tract.

Molybdenum (Mo) was detected at a very low concentration (.002 percent) in one of two panned concentrate samples taken within one mile of the property (Ellis, 1983, plate 1 and p. 27).

No mineral deposits are known in this area (Streufert and Cappa, 1994; U.S. Geological Survey, 1997a, b; Ellis, 1983). Mineral potential on this parcel is low.

Echo Valley
(Park Co., Windy Peak 24K, Bailey 100K, Denver 250K)

Echo Valley appears (at 1:250,000 scale) to be in Precambrian biotite gneiss (unit Xb) adjacent to the main body of the Pikes Peak Granite (Bryant and others, 1981; see attached map).

No mineral deposits are known on this property (Streufert and Cappa, 1994; U.S. Geological Survey, 1997a, b) although the Lone and Lonesome pegmatite (Ellis, 1983) is about 2 miles to the south. Potassium feldspar, biotite, and topaz(?) were mined from an open cut on the Lone

and Lonesome pegmatite (Ellis, 1983, p. 13 and 21). Mineral potential in Echo Valley is expected to be low.

Pine Nook
(Douglas Co., Kassler and Devils Head 24K)

The northernmost edge of this property is in the Kassler quadrangle, mapped entirely within the main body of the Pikes Peak Granite (Scott, 1963). Based on the geologic map of the Denver quadrangle (1:250,000 scale), the remainder of the property is also within the Pikes Pike Granite (Bryant and others, 1981; see attached map).

The property is only about 2 miles southeast of the Seventh Day property. It appears from the Forest Service map to be in an area of high recreational use. Numerous summer camps, trailheads, picnic areas, campgrounds and motorized trail access are available in the neighborhood. No mines or prospects have been noted on this particular piece of ground (U.S. Geological Survey, 1997a, b; Streufert and Cappa, 1994).

In the absence of pegmatites, mineral potential is expected to be low.

SUMMARY

Hickle: Moderate potential for Au, Ag, Cu, Pb, Zn, As, Sb, and Bi in veins but low probability of there being a minable deposit on the property.

Seventh Day: Moderate potential for small mica- and/or feldspar-bearing pegmatites, copper in veins or disseminated near faults, and uranium. No minable deposits known in the area.

Falkenberg: Low mineral potential for pegmatite and building stone.

Insmont: Low mineral potential.

Echo Valley: Low potential for pegmatites.

Pine Nook: Low potential for pegmatites.

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Bryant, Bruce, McGrew, L.W., and Wobus, R.A., 1981, Geologic map of the Denver 1° X 2° quadrangle, north-central Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-1163, scale 1:250,000.

Ellis, C.E., 1983, Mineral Investigation of the Lost Creek Wilderness, Park and Jefferson Counties, Colorado: U.S. Bureau of Mines [Open-File Report] MLA 61-83.

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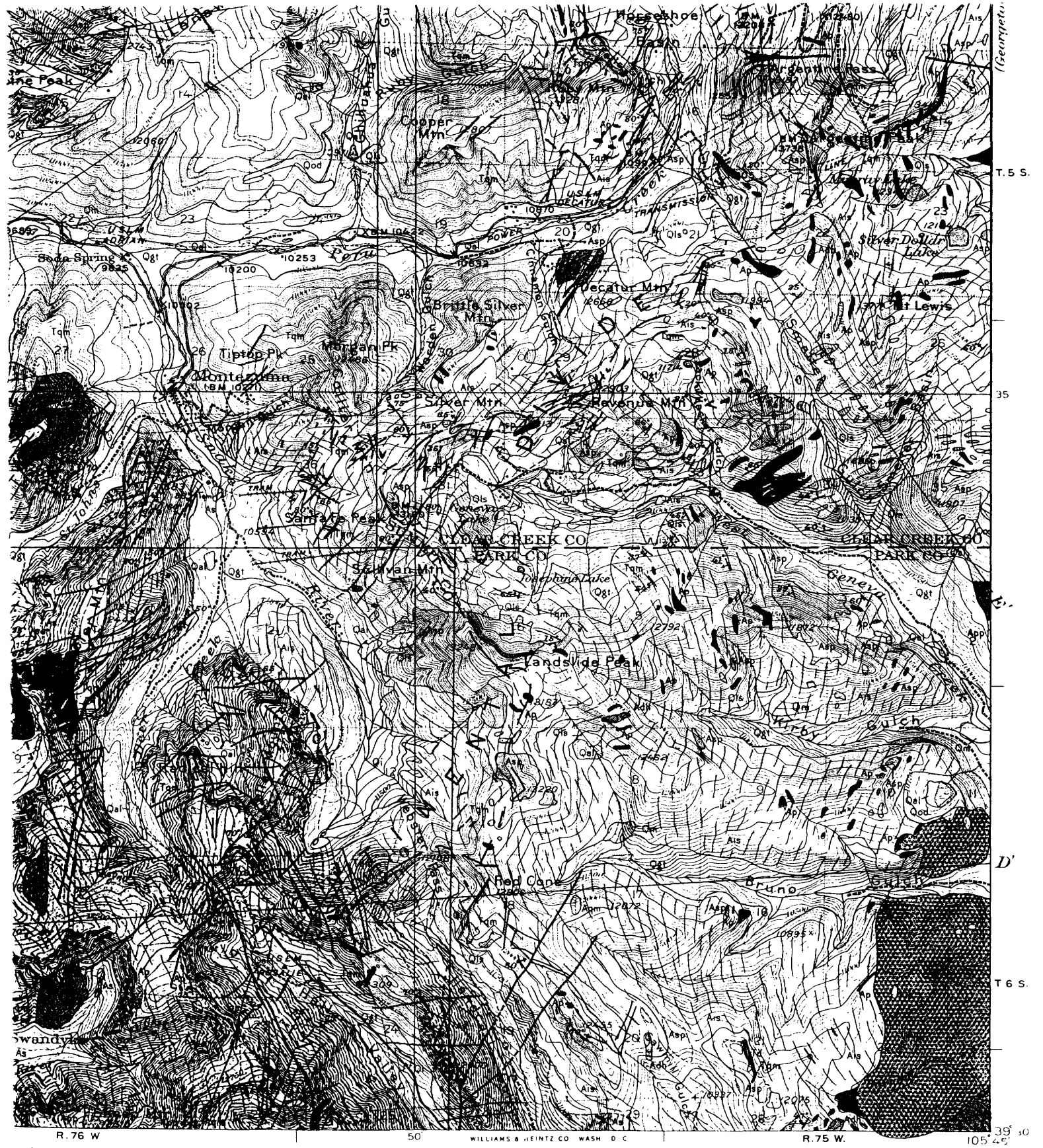

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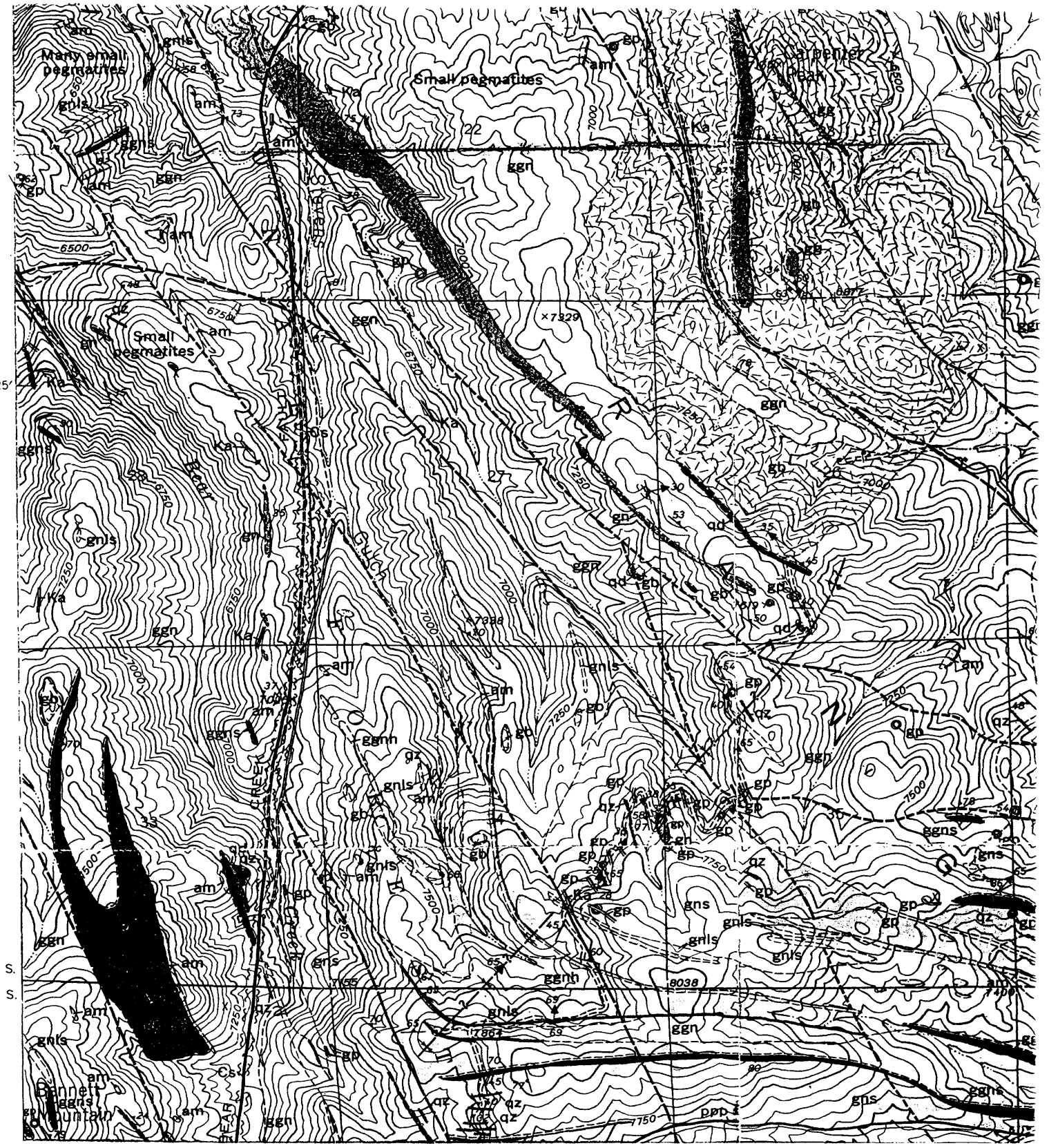

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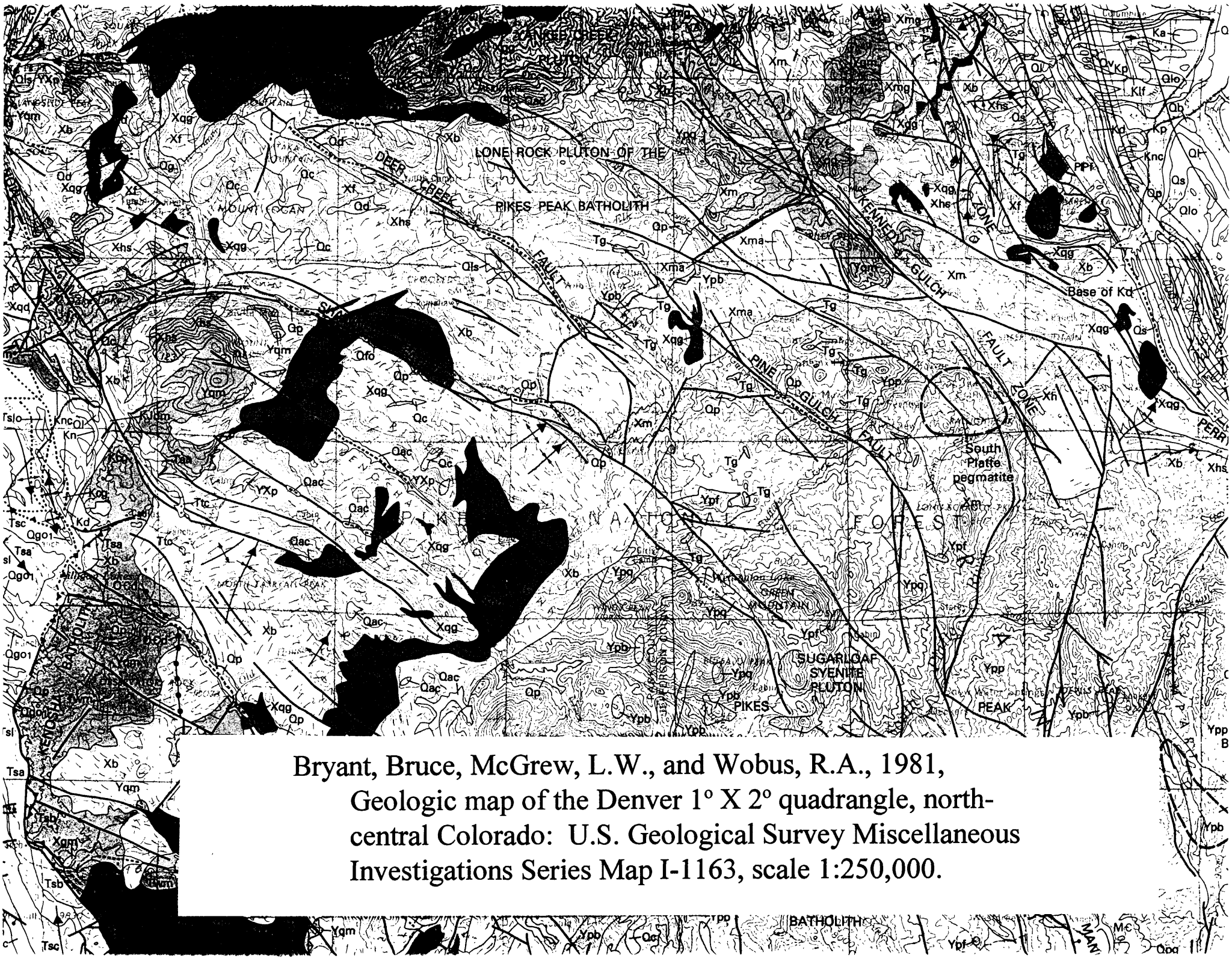

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LOCATABLE MINERAL REPORT FOR THE SHEPARD AND ASSOCIATES LAND EXCHANGE OFFER, SAN ISABEL AND PIKE NATIONAL FORESTS, EL PASO, HUERFANO, JEFFERSON, LAKE, AND PARK COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

September 4, 1997

EXHIBIT A: Property that Shepard and Associates, LLC will consider exchanging:

	acres:
A-1: Big Union Creek Parcel: in T10S, R79W, 6th Principal Meridian, Lake County, Colorado San Isabel N.F., Mount Sherman 24K	?
A-2: Buffalo Creek Parcel: in T8S, R71W, 6th Principal Meridian, Jefferson County, Colorado: Pike N.F., Green Mountain 24K	?
A-3: Goodman Claims: in T28S, R72W and R73W, 6th Principal Meridian, Huerfano County, Colorado: San Isabel N.F., Blanca Peak 24K	138
A-4: Lucero Claims: in T15S, R67W, 6th Principal Meridian, El Paso County, Colorado: Pike N.F., Mount Big Chief 24K	84
Acreage Shepard and Associates, LLC will consider exchanging:	**?**

EXHIBIT B: Property that the U.S. Forest Service will consider exchanging:

Two parcels in T8S, R72W, 6th Principal Meridian, Park County, Colorado: Pike N.F., Bailey and Windy Peak 24K	620
Acreage U.S. Forest Service will consider exchanging:	**620**
Total acreage	?

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

NON-FEDERAL LANDS

Parcel A-1: Big Union Creek
(Lake Co., San Isabel N.F., Mount Sherman 24K, Leadville 100 and 250K)

Parcel A-1 is in the Mosquito range, west of Weston Fault and east of Arkansas Valley graben. It is in 1.7 Ga granitic rocks (map unit Xg, see attached map) cut by several NNW-trending high angle faults (Tweto, 1974; Tweto and others, 1978). The creek bottom is covered with Pleistocene (Pinedale and Bull Lake) glacial drift composed of unconsolidated bouldery glacial deposits (till) and associated sand and gravel deposits.

The parcel is more than two miles south of the productive mineral district near Leadville (Tweto, 1974) and northwest of Ag, Pb, Zn occurrences near South Peak (Streufert and Cappa, 1994). The parcel is within an area assigned moderate potential for vein deposits of gold, silver, and base metals in fissures in siliceous host rocks (Taylor and others, 1984). On a site specific scale, the geology is permissive for the occurrence of gold, silver, and base metal vein-type deposits. However, there is no indication that the mineralizing processes acted here. Thus the mineral potential of this specific tract is low. No placers are known in the creek, but gravels should be tested for gold content.

Parcel A-2: Buffalo Creek
(Jefferson Co., Pike N.F., Green Mountain 24K, Bailey 100K, Denver 250K)

Parcel A-2 is in an area mapped as the main rock type of the Pikes Peak batholith (rock unit Ypp; see attached map). It is a pink to reddish, medium- to coarse-grained, biotite or hornblende-biotite granite (Bryant and others, 1981).

No mineral deposits are known in this area (Streufert and Cappa, 1995, U.S. Geological Survey, 1997a, b) although there are pegmatite deposits about 5 miles to the east in the South Platte district (Simmons and Heinrich, 1980; Haynes, 1965) and 3 miles to the southwest (Ellis, 1983) in similar host rocks. Mapping at 1:250,000 is insufficient to locate small pegmatite bodies. Mineral potential on this parcel is expected to be low.

Parcel A-3: Goodman Claims
(Huerfano Co., San Isabel N.F., Blanca Peak 24K and 100K, Trinidad 250K)

The Goodman Claims are on the north flank of Blanca Peak. The area is mapped as Early Proterozoic tonalite gneiss in the northeastern part adjacent to Early Proterozoic metagabbro (or metadiorite) in the southwest (Johnson and Bruce, 1991; Johnson and others, 1987). The contact between the metagabbro and tonalite gneiss is gradational from interlayered metagabbro to quartz diorite gneiss to tonalite gneiss (Johnson and Bruce, 1991; see attached map). Proterozoic mafic dikes are abundant in the tonalite near the contact with metagabbro and decrease within a short distance from contact (Johnson and Bruce, 1991). Quaternary alluvium covers the tonalite in Huerfano River (Johnson and Bruce, 1991).

The claims are in the Blanca district where "fault-controlled quartz veins occur in Precambrian gneissic tonalite and metadiorite (Johnson and others, 1984; Ellis and others, 1983). Two nearly parallel quartz veins in the gneissic tonalite strike N30W and are exposed for more than 2 mi (Johnson and others, 1984; Ellis and others, 1983). There was more than 3,000 ft of development along the veins. Gold and silver occur in nearly every sample (Ellis, 1983, Johnson and others, 1984). Gold is associated with pyrite (Ellis, 1983, Johnson and others, 1984). Silver is in a "red-gray mineral" (Ellis, 1983, Johnson and others, 1984). Visible scheelite may be unrelated to the gold and silver (Ellis, 1983, Johnson and others, 1984). Copper oxides are common (Johnson and others, 1984).

No entries in MAS/MILS (U.S. Geological Survey, 1997b) were found for Blanca Peak quadrangle. Two entries were found in MRDS (U.S. Geological Survey, 1997a): McMillan and Coronado groups (see attachments). Coronado includes the Eagle Plume and Dividend (also cited in Ellis and others, 1983, p. 23, 151, and 160) and is probably the same as at least part of the Goodman claims. McMillan is a report of a tellurobismuthenite mineral somewhere on the slopes of "Sierra Blanca".

The Blanca mineralized area was assigned high potential for gold-, silver-, and tungsten-bearing quartz veins localized along northwest-trending high-angle fault zones (Johnson and others, 1984; Taylor and others, 1984). Lead and bismuth may also be present in the district (Streufert and Cappa, 1994; Ellis, 1983). The district hosts polymetallic veins in carbonate poor rocks (Plumlee and others, 1995), a consideration, along with abundance of pyrite, in predicting water quality from mine drainages. The claims in the Huerfano River valley may have been at a mill site. Care should be exercised to avoid assuming environmental liability for acid mine drainage and high metal contents of waters.

Parcel A-4: Lucero Claims
(El Paso Co., Pike N.F., Mount Big Chief 24K, Colorado Springs 100K, Pueblo 250K)

Parcel A-4 is located more than three miles west of the Ute Pass fault and 1-2 mi. west of Cheyenne Mountain in 1.04 Ga Pikes Peak granite and localized inclusions of fayalite granite (Trimble and Machette, 1979; Scott and others, 1978). At least one, and possibly two arcuate faults cut the parcel on a northeasterly trend (Trimble and Machette, 1979; see attached map).

The parcel is at the core of the St. Peters Dome mining district which hosts fluorite-quartz veins and cryolite-bearing pegmatite dikes (Steven, 1949). The district was first prospected for gold and silver in the quartz-fluorite veins. The first fluorspar was produced in 1910 and 1911 from the Hughes Boss claim on the Duffields deposit and in 1917 and 1918 from the Timberline deposit (see attached map). Production resumed in 1944 and 1945 with fluorspar from Timberline, Duffields, and Mattie B. deposits (Steven, 1949, p. 261). It is not clear if there was any other production (Steven, 1949, U.S. Geological Survey, 1997b). Lead occurs with the ore in the district (U.S. Geological Survey, 1997b). The deposits at St. Peters Dome are similar to those at Cripple Creek district, 15 mi to the west (Steven, 1949, p. 274).

Parcel A-4 appears to follow the mapped fluorspar-quartz veins (Steven, 1949, p. 264, fig. 2) which include the Mattie B; Colorado shaft; Leyte open pit and Hughes Boss shaft of the Duffields deposit; and the Timberline surface workings and tunnel. The potential for remaining fluorspar ore in the vicinity of these deposits, especially at depth, is high. Potential for discovery of cryolite-bearing pegmatite is also high although the probability of it ever being mined is low.

FEDERAL LANDS

Two parcels near Estabrook
(Park Co., Pike N.F., Windy Peak and Bailey 24K; Bailey 100K, Denver 250K)

The northern part of the northern parcel is in the Bailey quadrangle (Bryant, 1976). It is underlain by 1.75 Ga biotite gneiss (map unit Xb). The remaining lands are in the main body of Pikes Peak Granite (Bryant and others, 1981; see description of Parcel A-2). Piney Creek alluvium (Upper Holocene) may be present in the stream valleys..

No mineral deposits are known on these tracts (Streufert and Cappa, 1995, U.S. Geological Survey, 1997a, b) although there are pegmatite deposits about 1 mile to the south at the Lone and Lonesome pegmatite (Ellis, 1983) and 6-10 miles to the east in the South Platte district (Simmons and Heinrich, 1980; Haynes, 1965) in similar host rocks. Potassium feldspar, biotite, and topaz(?) were mined from an open cut on the Lone and Lonesome pegmatite (Ellis, 1983, p. 13 and 21). Mapping at 1:250,000 is insufficient to locate small pegmatite bodies on the tracts. Mineral potential on these parcels is expected to be low.

SUMMARY

Parcel A-1 is within an area assigned moderate potential for vein deposits of gold, silver, and base metals in fissures in siliceous host rocks (Taylor and others, 1984). On a site specific scale, the geology is permissive for the occurrence of gold, silver, and base metal vein-type deposits. However, there is no indication that the mineralizing processes acted here. Thus the mineral potential of this specific tract is low. No placers are known in the creek, but gravels should be tested for gold content.

Parcel A-2 is not in an area of known mineral deposits. Mineral potential on this parcel is low.

Parcel A-3 is in an area that was assigned high potential for gold-, silver-, and tungsten-bearing quartz veins localized along northwest-trending high-angle fault zones (Johnson and others, 1984; Taylor and others, 1984). Lead and bismuth may also be present in the district (Streufert and Cappa, 1994). The district hosts polymetallic veins in carbonate poor rocks (Plumlee and others, 1995), a consideration, along with abundance of pyrite, in predicting water quality from mine drainages. The claims in the Huerfano River valley may have been at a mill site. Care should be exercised to avoid assuming environmental liability for acid mine drainage and high metal contents of waters.

Parcel A-4 has high potential for remaining fluorspar ore (Steven, 1949). Potential for discovery of cryolite-bearing pegmatite is also high although the probability of it ever being mined is low (Steven, 1949).

Federal Lands are about a mile north of a small pegmatite body, Lone and Lonesome, that produced potassium feldspar, biotite, and possibly topaz from an open cut. No other mineral deposits are known nearby. Mineral potential on this parcel is low.

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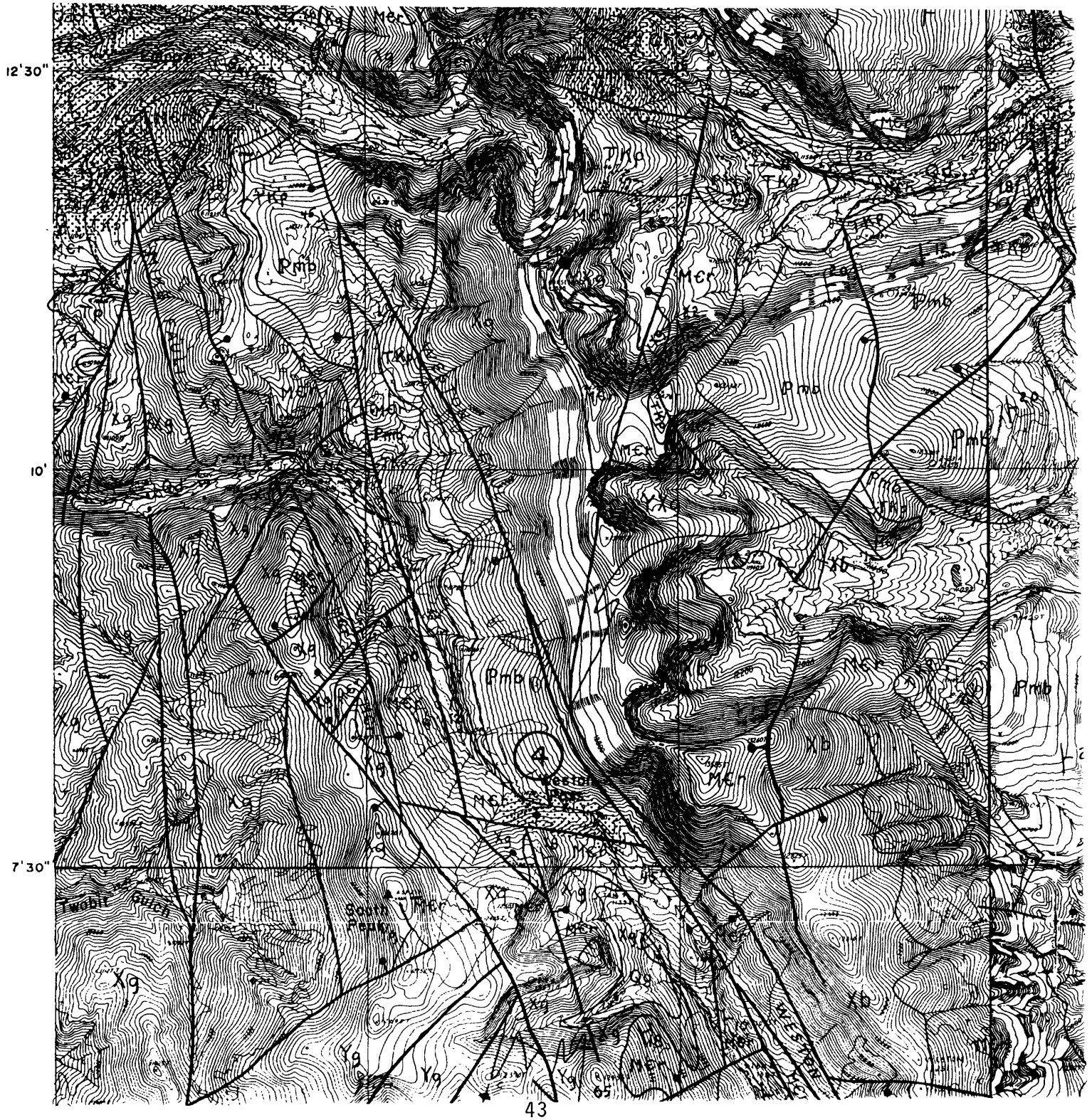

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TRACT A-3

Mineral Resources Data System (MRDS)

Report Title
Issue Date **Monday, March 9, 1992** *Number* of 59
Current Date Tuesday, August 26, 1997 *Current Time* 12:42:15 *Printed* 26 of 59

Record Number	D010569	*User Field*	
Record Type	Site	*File Link ID*	
Reporter	SCHWOCHOW, STEPHEN D.		
Reporter Affiliation	CGS	*Report Date*	83 05
* *Site Name*	CORONADO GROUP		
Synonym Name	UNPATENTED CLAIMS: (EAGLE PLUME); (KEYSTONE); (JESSIE MAE); (DIVIDEND); (INVINCIBLE)		

both in Ellis and others, 1983 p. 24 and fig 34, p. 1

– Location Information –

District Name	BLANCA DISTRICT		
Country	**UNITED STATES**	*Country Code*	**US**
State	**COLORADO**	*State Code*	**CO**
County	HUERFANO		
Physiographic Prov	09 SOUTHERN ROCKY MOUNTAINS		
Drainage Area	11020006 ARKANSAS-WHITE-RED		
Land Status	41 1975		
Quadrangle	BLANCA PEAK (1967)	*Scale*	24000
Quadrangle 2	TRINIDAD (1962)	*Scale*	250000
Quad 250k	Trinidad		
Elevation	14345 FT		
Latitude	**37-34-38N**	*Decimal Lat*	**37.57722**
Longitude	**105-29-07W**	*Decimal Long*	**-105.48527**
Accuracy	WITHIN 3-MILE RADIUS		

Section	**Section Fraction**	**Township**	**Range**	**Meridian**
19 20 29 30 31 32; 24 25 36;		028S; 028S;	072W; 073W;	SIXTH PRINCIPAL

Position 9.5 MILES N9W FROM BLANCA

Location Comments CDM MINE MGR. REPT. GIVES LOCATION AS ON MCMILLAN ROAD. EXACT LOCA TION HIGHLY UNCERTAIN. ELEV AND LAT-LONG GIVEN ARE FOR BLANA PEAK, AT COMMON CORNER OF SECS. 25 AND 36 (T28S, R73W), 30 AND 31 (T28S8 R72W)).

– Commodity Information –

Commodity Type	Metallic
Commodities	CU AU AG TE
Major	CU AU AG
Occurring	TE
Ore Materials	CHALCOPYRITE, UNKNOWN AU, UNKNOWN AG
Analytical Data	SULFIDE ORE AVERAGED $15 TO $30/TON WITH TRACE TE

– Geology –

Tectonic Setting CENTRAL CORDILLERA (SOUTHERN ROCKY MTNS)

Record Number	**D010569**	*(....Continued)*

Regional Trends	SIERRA BLANCA MASSIF, RIO GRANDE RIFT ZONE, FT. GARLAND EMBAYMENT
Local Structure	SANGRE DE CRISTO MOUNTAINS THRUST FAULT
Host Rock Type	GRANODIORITE GNEISS HORNBLENDE GNEISS METAQUARTZITE
Host Rock Age	PREC
Assoc Rock Type	HORNBLENDE DIORITE UNSPECIFIED INTERMEDIATE ROCKS
Assoc Rock Age	PREC; TERT

Host Rock Type Name	**Age**	**Host Rock Unit Name**	**Age**
		GRANODIORITE GNEISS	PREC
		HORNBLENDE GNEISS AND AMPHIBOLITE	PREC

Associated Rock Type Name	**Age**	**Associated Rock Unit Name**	**Age**
		HORNBLENDE DIORITE	PREC
		INTERMEDIATE STOCKS, LACCOLITHS, PLUGS, DIKES, AND SILLS	TERT

-- Deposit Description --

Deposit Size	Small
	--Individual Ore Bodies--
Deposit Type	VEIN

-- Exploration and Development --

Developent Status	Prospect, Inactive		
Year of Discovery		*Nature of Disc*	Ore Mineral in Place
Owner	SIERRA BLANCA MINING AND REDUCTION CO. (1901)		

-- Description of Workings --

Desc Workings	Underground
	--Individual Workings--
Workings Comments	120-FT TUNNEL WITH 60-FT RAISE; 184-FT CROSSCUT, 75-FT CROSSCUT, 50-FT CROSSCUT

-- Reference --

Reference	JOHNSON, R.B., 1969, GEOLOGIC MAP OF THE TRINIDAD QUADRANGLE, SOUTH -CENTRAL COLORADO: USGS MAP I-558.
Reference	COLORADO DIV. MINES MINE MGR. REPTS., 1900, P. 315; 1901, P. 173.
Info Source	12

Ellis, C. E. and others, 1983, U.S. Bureau of Mines MLA 65-83.

Page 2

Mineral Resources Data System (MRDS)

Report Title
Issue Date **Monday, March 9, 1992** *Number* of 59
Current Date Tuesday, August 26, 1997 *Current Time* 12:42:15 *Printed* 40 of 59

Record Number	D006754	*User Field*	
Record Type	Site	*File Link ID*	
Reporter	SCHWOCHOW, STEPHEN D.		
Reporter Affiliation	CGS	*Report Date*	81 04
Updater Affiliation		*Update Date*	83 05
Site Name	MCMILLAN GROUP		

– Location Information –

District Name	BLANCA DISTRICT ~~DISTRICT~~		
Country	**UNITED STATES**	*Country Code*	**US**
State	**COLORADO**	*State Code*	**CO**
County	HUERFANO		
Physiographic Prov	09 SOUTHERN ROCKY MTNS		
Drainage Area	11020006 ARKANSAS-WHITE-RED		
Land Status	41 (1975)		
Quadrangle	TRINIDAD ~~(1954)~~ 1962	*Scale*	250000
Quadrangle 2	~~TRINIDAD (1962)~~ Blanca Peak	*Scale*	24000
Quad 250k	Trinidad		
Elevation	12080 FT		
Latitude	**37-35-03N**	*Decimal Lat*	**37.58416**
Longitude	**105-29-03W**	*Decimal Long*	**-105.48416**
Accuracy	WITHIN 0.5-MILE RADIUS		

Section	Section Fraction	Township	Range	Meridian
25; 30		028S; 028S	073W; 072W	SIXTH PRINCIPAL

Position 11 MILES N 8 W FROM BLANCA

Location Comments ON NORTH SLOPE OF BLANCA PEAK IN HEADWATERS OF HUERFANO RIVER. LAT-LONG GIVEN IS PROJECTED EAST QUARTER-CORNER OF SEC. 25.

– Commodity Information –

Commodity Type	Metallic
Commodities	AU AG BI CU TE
Major	AU AG
Occurring	BI CU TE
Ore Materials	SYLVANITE (?), TELLUROBISMUTHITE, HESSITE

– Geology –

Tectonic Setting	CENTRAL CORDILLERA (SOUTHERN ROCKY MTNS.)
Regional Trends	SIERRA BLANCA MASSIF, RIO GRANDE RIFT ZONE, FT. GARLAND EMBAYMENT
Local Structure	SANGRE DE CRISTO MTNS THRUST FAULT
Ore Control	NW-TRENDING PRECAMBRIAN DIKE SWARM

Record Number **D006754** *(....Continued)*

Host Rock Type	GRANODIORITE GNEISS, HORNBLENDE GNEISS, METAQUARTZITE
Host Rock Age	PREC
Assoc Rock Type	HORNBLENDE DIORITE, BASIC (?) DIKES
Assoc Rock Age	PREC; TERT

Host Rock Type Name	**Age**	**Host Rock Unit Name**	**Age**
		GRANODIORITE GNEISS	PREC
		METAQUARTZITE	PREC
Associated Rock Type Name	**Age**	**Associated Rock Unit Name**	**Age**
		HORNBLENDE DIORITE	PREC
		INTERMEDIATE STOCKS, LACCOLITHS, PLUGS, DIKES, AND SILLS	TERT

-- Deposit Description --

Deposit Size	Small		
	--Individual Ore Bodies--		
Deposit Type	VEIN		
Deposit Form	TABULAR		
Width	60	*Units*	FT
Strike	VEINS N 7 W	*Dip*	VEINS 90

-- Exploration and Development --

Developent Status	Prospect, Inactive		
Year of Discovery		*Nature of Disc*	Ore Mineral in Place

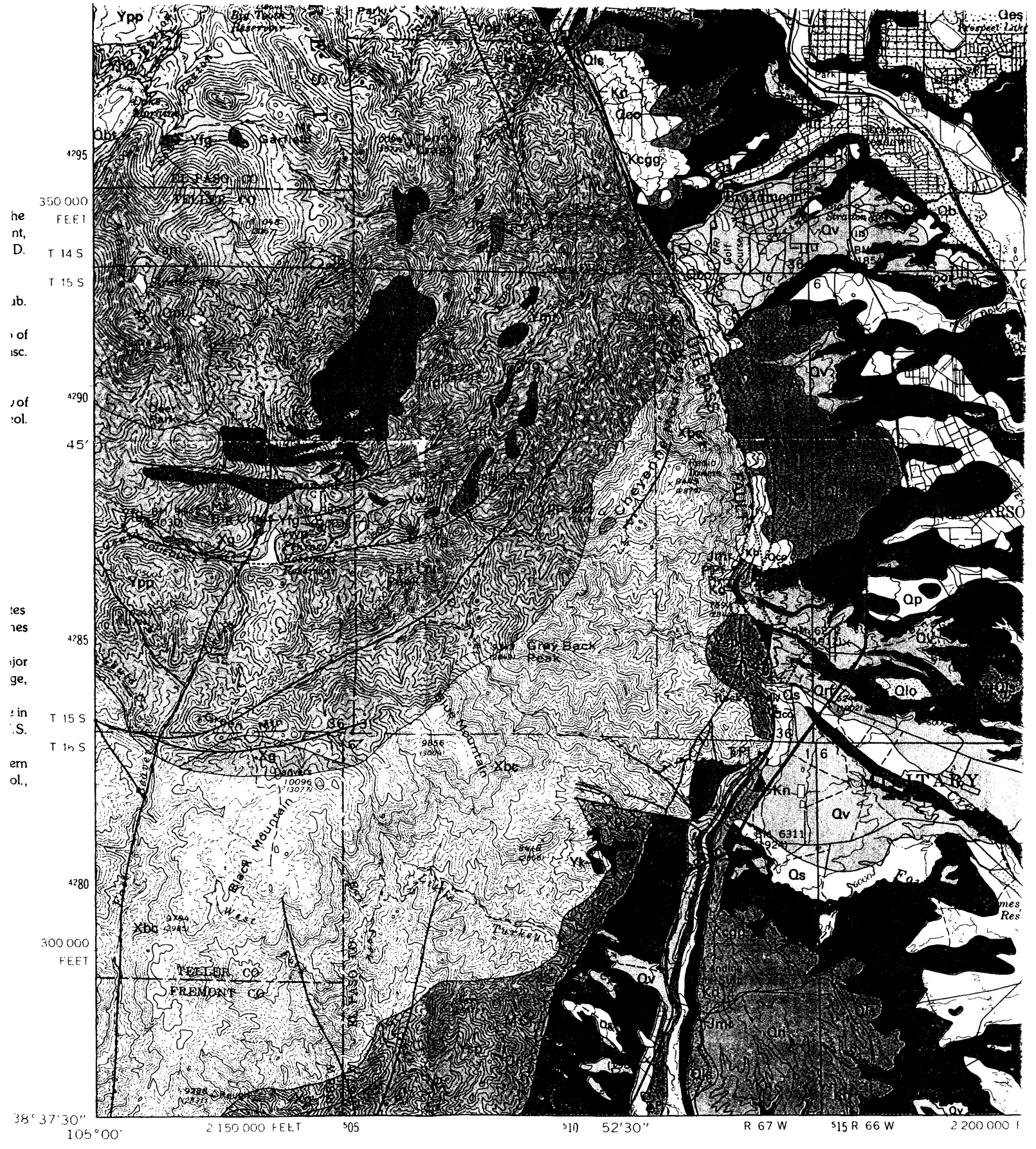
-- Description of Workings --

Desc Workings	Surface and Underground
	--Individual Workings--
Workings Comments	CROSSCUT TUNNEL AND 40-TON CONCENTRATING MILL

-- Reference --

Reference	VANDERWILT, J.W., 1947, MINERAL RESOURCES OF COLORADO: COLORADO MINERAL RESOURCES BD., P. 31.
Reference	ECKEL, E.B., 1961, USGS BULL. 1114, P. 322-323.
Reference	COLO. DIV. MINES 1901-02 BIENN. REPT., P. 97-98.
Info Source	12

Vanderwilt puts Blanca in Alamosa Co. not Huerfano Co.



Trimble, D.E., and Machette, M.N., 1979, Geologic map of the Colorado Springs - Castle Rock area, Front Range urban corridor, Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-857-F, scale 1:100,000.

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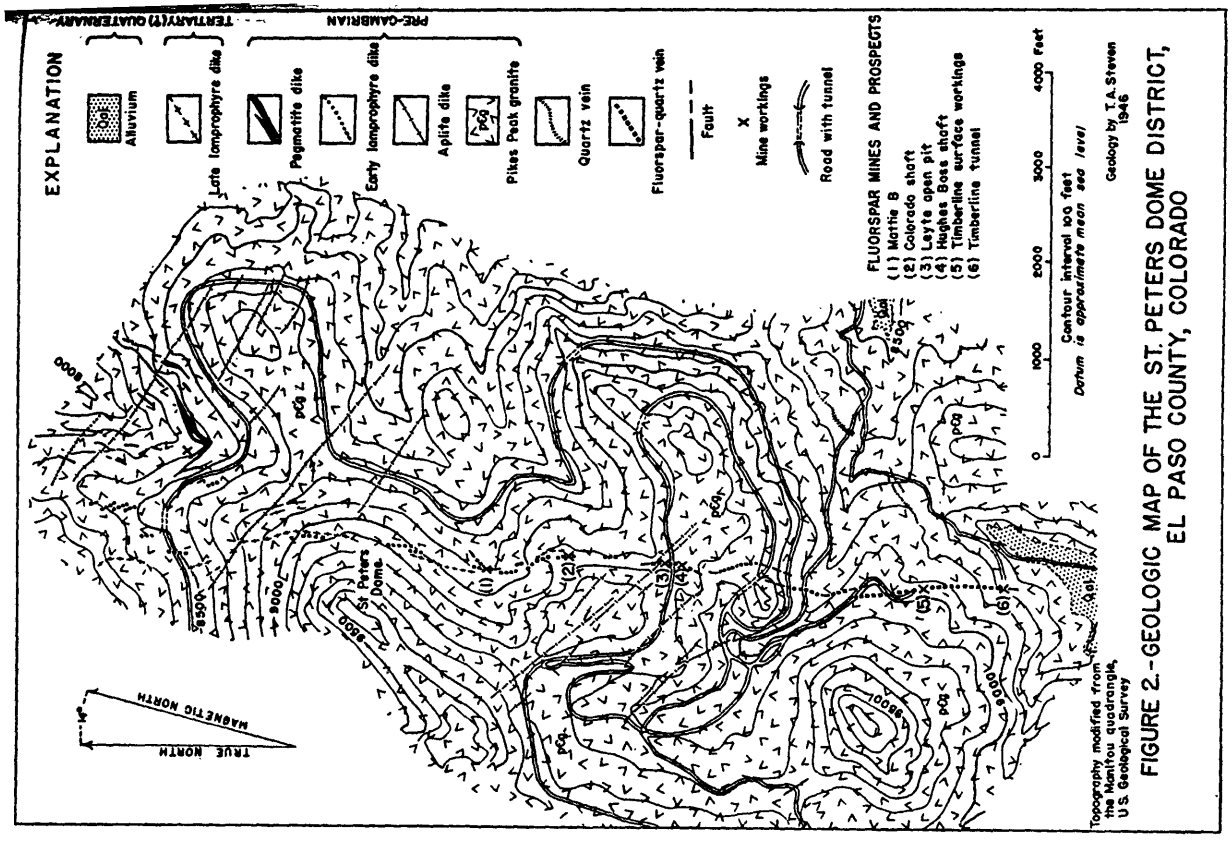
FEET

CONTOURS



Steven, T.A., 1949, Geology and fluorspar deposits of the St. Peters Dome district, Colorado: Colorado Scientific Society Proceedings, v. 15, no. 6, p. 257-284

LOCATABLE MINERAL REPORT FOR THE LARRY AND VI CARPENTER LAND EXCHANGE OFFER, ROOSEVELT NATIONAL FOREST, LARIMER COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

September 17, 1996

EXHIBIT "A": Property that Larry and Vi Carpenter shall consider exchanging:

T5N, R71W, Sixth Principal Meridian, Colorado
Sec. 27, SE 1/4 SW 1/4 41.0 acres

Early Proterozoic moderately high-grade mica schist and phyllite interbedded with quartzofeldspathic metasandstone underlies Property A. The mineral assemblage typically includes quartz, plagioclase, magnetite, biotite, muscovite, and sillimanite. A north-trending schistosity dips to the east. The schist was intruded by Early to Middle Proterozoic coarse-grained pegmatite which is interfingered with the schist on Property A. Some pegmatites in the quadrangle (Pinewood Lake) may be related to Silver Plume Granite, but it is unclear from the geologic map if this particular pegmatite is (Punongbayan and others, 1989). The high-angle, north-trending, Rattlesnake Mountain fault, approximately 1 mi to the east, drops rocks on the west (including Property A) on the order of 2,000 ft, relative to rocks farther east. There are no mines in the immediate vicinity.

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

T6N, R72W, Sixth Principal Meridian, Colorado
Sec. 23, NW 1/4 SW 1/4 40.00 acres

"Property B" is entirely within Early Proterozoic high-grade knotted mica schist--mostly porphyroblastic biotite. Contains interbedded quartzofeldspathic mica schist and in some places in the quadrangle, although not known if they occur on this property, thin beds of granule-size metaconglomerate. Slightly higher grade than property A, the schist contains an assemblage of quartz, plagioclase, magnetite, biotite, sillimanite, and microcline. The area is immediately north of a northwest-trending mylonitized fault or fracture zone that the valley of Dunraven Glade follows and continues into the Thompson Canyon fault farther to the southeast. No pegmatites are mapped on the property (Bucknam and Braddock, 1989) and no mines are in the immediate vicinity.

SUMMARY:

Both properties are on the outskirts of the Crystal Mountain pegmatite district which has centers at Crystal and Storm Mountains (Hanley and others, 1950; Thurston, 1955; Meeves and others, 1966). Most well known of the deposits is the Hyatt Mine, a zoned pegmatite that produced 50 tons of beryl, 30 tons scrap mica, and 400 tons potassium feldspar (Gilkey, 1960). Geology of the area surrounding the Hyatt Mine is similar to, although lower metamorphic grade than, Properties A and B (Braddock and others, 1970). Pegmatite underlies approximately half of Property A, however, it doesn't appear that the pegmatite is of interest for mining. No pegmatite is known to occur on Property B. There are several known mineral collecting localities in the district, but not at either property (Eckel, 1961). Uranium minerals have been reported at the New Hope, Hide Above Lode, and Hyatt Ranch mine (Nelson-Moore and others, 1978), but there is no indication that any have been located on Properties A and B (Hills and others, 1982). Reports of copper and gold in a mining district at Drake, between these two properties, is unsubstantiated (Vanderwilt, 1947).

REFERENCES:

Braddock, W.A., and others, 1970, Geologic map of the Drake quadrangle, Larimer County, Colorado: U.S. Geological Survey Map GQ-829.

Bucknam, R.C., and Braddock, W.A., 1989, Geologic map of the Glen Haven quadrangle, Larimer County, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-1626, scale 1:24,000.

Eckel, E.B., 1961, Minerals of Colorado--A 100-year record: U.S. Geological Survey Bulletin 1114, 399 p.

Gilkey, M.M., 1960, Hyatt Ranch pegmatite, Larimer County, Colorado: U.S. Bureau of Mines RI-5643, 18 p.

Hanley, J.B., and others, 1950, Pegmatite investigations in Colorado, Wyoming, and Utah, 1942-1944: U.S. Geological Survey Professional Paper 227, p. 99-102.

Hills, F.A., and others, 1982, National Uranium Resource Evaluation, Greeley quadrangle, Colorado: U.S. Geological Survey, PGJ/F-079(82)

Meeves, H.C., and others, 1966, Reconnaissance of beryllium-bearing pegmatite deposits in six western states: U.S. Bureau of Mines IC-8298, p. 30.

Nelson-Moore, J.L., and others, 1978, Radioactive mineral occurrences of Colorado and Bibliography: Colorado Geological Survey Bulletin 40, p. 209.

Punongbayan, R., Cole, J.C., Braddock, W.A., and Colton, R.B., 1989, Geologic map of the Pinewood Lake quadrangle, Boulder and Larimer Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-1627, scale 1:24,000.

Thurston, W.R., 1955, Pegmatites of the Crystal Mountain district, Larimer County, Colorado: U.S. Geological Survey Bulletin 1011, 185 p.

Vanderwilt, J.W., 1947, Mineral resources of Colorado: Mineral Resource Board, Denver, Colorado, 547 p.

The following report was unavailable for reference due to the temporary closure of the Denver USGS library. It is possible that it may include information pertaining to the properties involved in this exchange.

Dickerson, R.P., 1986, Mineral resource potential of National Forest RARE II and wilderness areas in Colorado: U.S. Geological Survey Open-File Report 86-364, 178 p.

LOCATABLE MINERAL REPORT FOR THE
SMITH RANCHO LAND EXCHANGE OFFER,
ROUTT NATIONAL FOREST,
ROUTT COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

August 13, 1997

EXHIBIT A: Property that Smith Rancho will consider exchanging:

T9N, R87W, 6th Principal Meridian, Routt County, Colorado:	acres:
Tract 40 in Secs. 8, 9, 16, and 17	160
Acreage Smith Rancho will consider exchanging:	**160**

EXHIBIT B: Property that the U.S. Forest Service will consider exchanging:

T10N, R87W, 6th Principal Meridian, Routt County, Colorado:	
Sec. 20: tracts 1, 4, 5, 6, 7, and NE1/4 NE1/4	100.50
Sec. 24, W1/2 NW1/4	80.00
Subtotal	**180.50**
* Sec. 14: tract 7 and SE1/4 SE1/4	43.73
Patent deed to property, currently a road across lots 3 and 9, Sec. 23, T10N, R87W	
Acreage U.S. Forest Service will consider exchanging:	**224.23**
Total acreage	384.23

*This acreage will be dropped if not needed to equalize valuation.

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with other unpublished documents, personal communications, and professional experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Smith Rancho: (Quaker Mtn. and Bears Ears 7 1/2' quadrangle, Craig 30' X 60')
AND
Federal Land: (Meaden Peak 7 1/2' quadrangle, Craig 30' X 60')

From a geological perspective, the Smith Rancho and Federal tracts are similar. Both are in Upper Cretaceous Lewis Shale (Tweto, 1976, unit Kls) although the Smith Rancho tract is in the upper part of the unit and the Federal tract is in the lower part. In this area, the Lewis Shale is chiefly dark-gray to bluish marine shale that "crops out in a wide, curving strip of rolling, treeless country" (Bass and others, 1955, p. 159). The Smith Rancho property may possibly include a small part of the basal Lance Formation (Kl) in the northwest corner of the tract (Bass and others, 1955). Lance Formation is interbedded gray shale, light-buff and light-tan, soft, fine-grained sandstone, and contains a few coal beds Only the Kimberley coal bed has much economic value (Bass and others, 1955, p. 160) but it occurs higher in the formation so there is little chance that this bed would occur in the tract.

There are no known mines, claims, prospects, or occurrences in similar host rocks in the area (U.S. Geological Survey, 1997a, b). The tracts are more than 7 mi west of, and in different rock units than, the mineral deposits and occurrences near Hahns Peak.

Both tracts are included in an area assigned high coal potential at an assessment scale of 1:250,000 (Soulliere and others, 1996). However, only the Lance Formation has any coal beds and it is only minimally present, perhaps in the extreme NW corner of the Smith Rancho tract. Based on local geology and map unit descriptions, the actual potential for coal on these specific properties is very low.

Because shale is inherently unstable, both properties should be assessed for slope stability if construction activities are anticipated.

References Cited:

Bass, N.W., Eby, J.B., and Campbell, M.R., 1955, Geology and mineral fuels of parts of Routt and Moffat Counties, Colorado: U.S. Geological Survey Bulletin 1027-D, p. 143-250, scale 1:62,500.

Soulliere, S.J.; Toth, M.I.; Bankey, Viki; Smith, S.M.; Pitkin, J.A.; Cookro, T.M.; Robinson Roberts, L.N.; Molnia, Carol; Wandrey, C.J.; Law, B.E.; Spencer, C.W.; and Barker, C.E., 1996, Mineral resource potential and geology of the Routt National Forest and the Middle Park Ranger District of the Arapaho National Forest, Colorado: U.S. Geological Survey Open-File Report 96-082, 163 p., 3 plates.

Tweto, Ogden, 1976, Geologic map of the Craig 1° X 2° quadrangle, northwestern Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-972, scale 1:250,000.

U.S. Geological Survey, 1997a, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997b, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

LOCATABLE MINERAL REPORT FOR THE FOREST LAKES ASSOCIATES LAND EXCHANGE OFFER, SAN JUAN NATIONAL FOREST, LA PLATA, SAN JUAN, AND SAN MIGUEL COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

February 14, 1997

EXHIBIT A: Property that the U.S. Forest Service shall consider exchanging:

T35N, R6W, New Mexico Principal Meridian, La Plata County, Colorado:

Sec. 6: Lot 5 (SW1/4 NW1/4)		37 acres
Acreage USFS will consider exchanging:		37 acres

EXHIBIT B: Property that Forest Lakes Associates shall consider exchanging:

T41N, R8W, New Mexico Principal Meridian, San Juan and San Miguel Counties, Colorado:

Sec. 7:	Beauty of the West	USMS No. 1837	10.29 acres
	Thunder Shower,	USMS No. 1801	8.92 acres
Secs. 18&19:	Mineral Slope Nos. 1, 2, 3, and 4,	USMS No. 19486	33.52 acres
Acreage Forest Lakes Associates will consider exchanging:			52.73 acres

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal tracts (Beauty of the West, Thunder Shower, and Mineral Slope claims)
(Silverton 100K, Ophir 24K quadrangles)

Unless otherwise cited, the geologic descriptions on which this assessment is based, are from newly available mapping by R.G. Luedke (1996). Bedrock is upper Paleozoic and Mesozoic, mainly clastic, sedimentary rocks that dip west to southwest. These rocks are unconformably overlain by Tertiary volcanic rocks that are flat lying to gently eastward-dipping. This volcanic assemblage is predominantly volcaniclastic rocks of intermediate composition in the lower part and welded ash-flow tuff of silicic composition in the upper part. Middle to late(?) Tertiary igneous dikes, sills, and small bodies of intermediate composition intruded the bedded rocks. Two large stocks, the Ophir (northwest of the tracts) and Grizzly Peak (southwest of the tracts) were emplaced about 26 Ma. Contact metamorphism extends about several hundred meters from these stocks but isn't prominent near the small intrusions. During Pleistocene the region was extensively glaciated: the resulting alpine topography is locally covered with a variety of surficial deposits (Luedke, 1996).

In the northern part of Ophir quadrangle, faults are oriented E-W, are long, pronounced, and mineralized. In the central and southern part of the quadrangle, including the Ice Lake Basin area (where the tracts considered for exchange are located), faults are generally NE- and NW- trending, short, and only minimally mineralized (Luedke, 1996).

At small scale (1:250,000), the general area including the Ice Lake Basin area is identified as favorable for the occurrence of two types of deposits: polymetallic and replacement skarn deposits and Creede-type epithermal veins in Tertiary volcanic terrane (Van Loenen and others, in press). Yet, on a site-specific scale, the geology within these tracts differs considerably from the regional generalizations on which the favorable designation is based. Primarily, these tracts are not in carbonate terrane and are quite distant from porphyry deposits. Considerable local exploration work in the Ice Lake Basin area in the 1960's yielded no significant discoveries (R.G. Luedke, U.S. Geological Survey, retired, verbal commun. 2/5/97)--nor did prospectors find much in the previous 80 years or so. Intermittent, small-scale exploration for veins of Au, Ag, (Cu, Pb, Zn) is likely to continue in the Ice Lake Basin area (Neubert and others, 1992). However, this area is south of the region of intense mineralization.

> Beauty of the West follows northeast-trending veins in the Burns Member of the Oligocene Silverton Volcanics and underlying San Juan Formation. These are intruded by a small mass of ~26 Ma granodiorite. Both the intrusive and extrusive rocks are hydrothermally altered--predominantly to quartz-sericite-clay. The northeastern end of the claim is buried under a rock glacier, the southwestern end is covered with talus. An early map (Cross and Purington, 1899) shows a gold quartz vein in this vicinity. Gold concentrations in samples taken from known mineralized veins and abandoned mine dumps in the vicinity are anomalous but subeconomic (Neubert and others, 1992).

Thunder Shower follows a vein in the Burns Member of the Silverton Volcanics. Hydrothermal alteration is prominent at the northern end of the claim. There is no indication from the available literature of mineralization on this claim.

Mineral Slope (probably also known as Kinney Group) is in San Juan Formation and underlying sedimentary rocks from the Eocene Telluride Conglomerate to the top of the Permian Cutler Formation. Three caved adits are in silicified siltstone, probably Morrison or Wanakah Formations. At least one of the adits follows a northwest trending quartz vein. Neubert and others (1992) observe that these adits lie more than 1000 ft both stratigraphically and vertically below other mine sites in the Ice Lake Basin area, suggesting that the vertical extent of mineralization was considerable. There is no record of production from this property.

None of these claims appear in the MRDS or MAS databases. Little is known about any of the mining activity, past or present, in this district. There could be potential for acid-sulfide drainage from mines in this area.

Federal Tract
(Durango 100K, Ludwig Mountain 24K)

This tract is mapped as being in gently south dipping, Cretaceous Dakota Sandstone and Burro Canyon Formation, undifferentiated (Hail and others, 1971). Based on location of the tract near the base of the unit, it is probably in the chert-pebble conglomerate and green gray claystone of the Burro Canyon Formation. No mining is known to have occurred in this area (USGS, 1996, 1997).

SUMMARY:

The three designated non-federal tracts in Ice Lake Basin area occur in an area designated as having potential for base and precious metal polymetallic replacement, skarn, and epithermal vein (Creede) types of mineral deposits. However, in the case of the San Juan National Forest, the quantitative implication of a favorable designation means only that a 50 acre parcel of land so designated, would have between a 1 in 5,000 and a 1 in 10,000 chance for the occurrence of either a polymetallic replacement or epithermal (Creede-type) vein deposit (G.T. Spanski, U.S. Geological Survey, written commun. 2/12/97). It is unlikely that any deposit in this district would be economically viable in the foreseeable future. It is recommended that any existing mine dumps and effluent be examined for potential metal-mine drainage hazards.

Resource potential of the Federal tract north of Bayfield is low. No mineral resources are known to occur in the area.

REFERENCES:

Cross, Whitman, and Purington, C.W., 1899, Description of the Telluride quadrangle, Colorado: U.S. Geological Survey Geologic Atlas, Folio 57, 19 p., scale 1:62,500.

Hail, W.J., Jr., Barnes, Harley, and Zapp, A.D., 1971, Geologic reconnaissance map of the Rules Hill and Ludwig Mountain quadrangles, La Plata County, Colorado: U.S. Geological Survey Open-File Report 71-143, scale 1:48,000.

Luedke, R.G., 1996, Geologic map of the Ophir quadrangle, San Juan, San Miguel, and Dolores Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-1760, scale 1:24,000.

Neubert, J.T., and others, 1992, Mineral appraisal of San Juan National Forest, Colorado: U.S. Bureau of Mines Mineral Land Assessment Open-File Report MLA 2-92, 311 p.

U.S. Geological Survey, 1996, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

Van Loenen, R.E., Gibbons, A.B., Raby, A.G., and Dersch, J.S., in press, Mineral Resource Potential and Geology of the San Juan National Forest, Colorado: U.S. Geological Survey Bulletin 2127, 140 p.

ADDITIONAL REFERENCE CONSULTED

Steven, T.A., Lipman, P.W., Hail, W.J., Jr., Barker, Fred, and Luedke, R.G., 1974, Geologic map of the Durango quadrangle, southwestern Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-764, scale 1:250,000.

LOCATABLE MINERAL REPORT FOR THE
BILLORADO (CARSTENS) LAND EXCHANGE OFFER,
UNCOMPAHGRE NATIONAL FOREST
MONTROSE AND OURAY COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

August 21, 1996

EXHIBIT "A": Property that Billorado Properties (William Carstens) shall consider exchanging:

		acres
CA-1		58
	T46N, R10W: A parcel in Sec. 9 and 16	
CA-2		480
	T45N, R11W: Sec 3: S 1/2 SW 1/4	
	Sec. 9: E 1/2 E 1/2	
	Sec. 10: W 1/2 NW 1/4	
CA-3		200
	T45N, R11W: Sec. 4: SW 1/4, SW 1/4 SE 1/4	
CA-4		70
	T45N, R11W: Sec. 15: NE 1/4 NW 1/4, NE 1/4 SE 1/4 NW 1/4; E 1/2 NW 1/4 NW 1/4	
CA-5		160
	T42N, R10 and 11W: Sec. 30 and 25: Grove Placer	
CA-6		10.33
	T43N, R7W: Sec. 8: Fortune Teller Lode M.S. 17420	
CA-7	(To be offered as necessary for equalization)	
	T49N, R5W: Sec. 8,9,16, and 17: Portions as deemed necessary	

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

NF-1				40
	T46N, R10W:	sec. 2:	SE 1/4 SE 1/4	
NF-2				265
	T46N, R10W:	Sec 9:	E 1/2 NE 1/4	
			A portion of the W ½ of the NE 1/4 east of Road 510	
			E 1/2 SE 1/4	
			E 1/2 NW 1/4 SE 1/4	
			NW 1/4 NW 1/4 SE 1/4	
		Sec. 16:	NE 1/4 NE 1/4 NE 1/4	
NF-3				120
	T45N, R11W:	Sec. 10:	E 1/2 NE 1/4, NE 1/4 SE 1/4	
NF-4				25
	T45N, R11W:	Sec. 15:	N 1/2 SE 1/4 NE 1/4, E 1/2 SE 1/4 SE 1/4 NE 1/4	
NF-5				50
	T45N, R11W:	Sec. 10:	SW 1/4 SE 1/4	
		Sec. 15:	NE 1/4 NW 1/4 NE 1/4	
NF-6				480
	T45N, R11W:	Sec. 3:	NE 1/4, N 1/2 SE 1/4	
	T46N, R11W:	Sec. 34:	SE 1/4, a portion of the NE 1/4 east of Road 510	
NF-7				(none given)
	T46N, R10W:	Sec. 16:	A 60' strip east of FS 510	

SUMMARY:

These properties are in Montrose and Ouray Counties on Montrose and Nucla 30X60 maps (Hotchkiss, Government Springs, and Horsefly Peak 7 1/2-min. quadrangles). There are no known mines, claims, prospects, or mining districts in the area (USGS, 1996; Davis and Streufert, 1990).

The properties are on either side of the axis of the northwest-trending Uncompahgre Uplift (Colorado Geological Survey, 1991), primarily in Dakota Sandstone and Burro Canyon Formation (Williams, 1964; Tweto and others, 1976). There may be a small sliver of Jurassic sandstone, shale, or mudstone on the easternmost edge of the properties south of Road 510 (Williams, 1964). Northwest trending, high angle faults, roughly parallel to the axis of the uplift, may cross the properties (Williams, 1964; Tweto and others, 1976). This area is not well mapped -- both geologic maps rely on unpublished mapping (photogeology and reconnaissance scale) for this area.

REFERENCES:

Colorado Geological Survey, 1991, Oil and gas fields map of Colorado: Colorado Geological Survey Map Series 26, scale 1:500,000.

Davis, M.W., and Streufert, R.K., 1990, Gold occurrences of Colorado: Colorado Geological Survey Resource Series 28, 101 p.

Tweto, Ogden, Steven, T.A., Hail, W.J., Jr., and Moench, R.H., 1976, Preliminary geologic map of the Montrose 1 X 2 degree quadrangle, Southwestern Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-761, scale 1:250,000.

U.S. Geological Survey, 1996, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

Williams, P.L., 1964, Geology, Sturcture, and Uranium deposits of the Moab quadrangle, Colorado and Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-360, scale 1:250,000.

LOCATABLE MINERAL REPORT FOR THE
SAWTOOTH LIMITED PARTNERSHIP LAND EXCHANGE OFFER,
UNCOMPAHGRE NATIONAL FOREST,
OURAY COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

November 18, 1996

EXHIBIT "A": Property that Sawtooth Limited Partnership shall consider exchanging:

T46N, R7W, New Mexico Principal Meridian, Colorado	acres
Sec. 14, N ½ SW ¼	80.0
Sec. 35, N ½ NW ¼ NE ¼	20.0
TOTAL	100.0

EXHIBIT "B": Property that Forest Service shall consider exchanging:

T46N, R7W, New Mexico Principal Meridian, Colorado	acres
Sec. 23, SE ¼ NW ¼	40.0
Sec. 23, NE ¼ SW ¼	40.0
Sec. 35 S ½ NE ¼ NW ¼	20.0
TOTAL	100.0

SUMMARY:

The properties under consideration are on the northwest flank of the middle Tertiary San Juan volcanic field. They are in Holocene and Pleistocene landslide material (boulders, cobbles, and clay, primarily formed by repeated slumps, mudflows, earthflows, and rockfalls) that overlies Tertiary and Cretaceous sedimentary rocks (Dickinson, 1988).

There are no known locatable mineral resources in the immediate area.

Maps by Dickinson (1988) and Cross and others (1907) show coal-bearing rocks of the Fruitland Formation underlie the potential land exchange area. Because the coal-bearing rocks are mostly covered by surficial debris, the potential for coal resources is difficult to assess. Faults disrupted

the continuity of the coal beds and made mining difficult but the extent of faulting cannot be mapped at the surface due to the extensive landslide cover. Coal is from 9.1 to 12.2 m. thick at the three, now caved, mines in the vicinity (Economy (labeled Kennedy on Uncompahgre National Forest map), Kennedy (unlabeled on Unc.N.F. map), and Lou Creek (not shown on Unc.N.F. map) mines. Coal rank ranges from subbituminous B to subbituminous C.

Several invertebrate fossil localities (two shown within about 1 to 2 mi. of the southernmost land exchanges on Dickinson (1988); one in Mancos shale, the other in the landslide unit), fossil leaves and petrified wood fragments (in the underlying Cretaceous Cimmaron Ridge formation) are found in the general vicinity.

REFERENCES:

Cross, Whitman, Howe, Ernest, and Irving, J.D., 1907, Description of the Ouray quadrangle, Colorado: U.S. Geological Survey Geologic Atlas of the United States, Folio 153, 20 p., scale 1:62,500.

Dickinson, R.G., 1988, Geologic map of the Courthouse Mountain quadrangle, Gunnison, Hinsdale, and Ouray Counties, Colorado: U.S. Geological Survey Map GQ-1644, scale 1:24,000.

LOCATABLE MINERAL REPORT FOR THE
TOWN OF VAIL (TRAPPERS RUN) LAND EXCHANGE OFFER,
WHITE RIVER NATIONAL FOREST
EAGLE COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

October 9, 1997

EXHIBIT "A": Property that Town of Vail (Trappers Run) shall consider exchanging:

T5S, R81W 85.8 acres

Parcel O1: Sec. 14: Lots 16 and 19
Middle Pennsylvanian Minturn Formation with grit marker bed. Two east-west trending faults downdropped to the north. The southern of these faults dips 70 to the north. Some Pleistocene Bull Lake glacial drift and Holocene and Pleistocene alluvium covers the basement rocks.

Parcel O2: Sec. 14: Lot 21
Middle Pennsylvanian Minturn Formation with grit marker bed. The southern of the above two east-west faults dips 70 to the north. Some Pleistocene Bull Lake glacial drift and Holocene and Pleistocene alluvium covers the basement rocks.

Parcel O3: Sec. 14: See description
Middle Pennsylvanian Minturn Formation with grit marker bed. Two east-west trending faults downdropped to the north. The southern of these faults dips 70 to the north. Some Pleistocene Bull Lake glacial drift and Holocene and Pleistocene alluvium covers the basement rocks.

Parcel O4: Sec. 11: See description
Middle Pennsylvanian Minturn Formation with White Quail Limestone Member overlain by Pleistocene Bull Lake glacial drift.

Parcel O5: Sec. 11: See description
Middle Pennsylvanian Minturn Formation with White Quail Limestone Member overlain by Pleistocene Bull Lake glacial drift.

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

T5S, R79W

Parcel S1: Sec. 18: Lots 3, 4, and 5

Parcel S2: Sec. 18: Metes and Bounds within HES 247

T5S, R80W

Parcel S3: Sec. 2: Metes and Bounds in SW1/4 NW 1/4
Middle Pennsylvanian Minturn Formation dipping 12-15 south with limestone marker beds and overlain by younger Pleistocene Pinedale age glacial drift.

Parcel S4: Sec. 2: NW 1/4 of SE 1/4 in I-70 easement
Holocene and Pleistocene alluvium and possibly Pinedale age glacial drift overlying gently south-dipping Middle Pennsylvanian Minturn Formation.

Parcel S5: Sec. 7: Portion of A and B in S 1/2 of NE 1/4
Middle Pennsylvanian Minturn Formation with carbonate marker beds in Robinson Limestone Member.

Parcel S6: Sec. 12: NE 1/4 of NW 1/4 in I-70 easement
Pinedale age glacial drift overlying Minturn Formation.

Parcel S7: Sec. 12: SW 1/4 of NE 1/4 in I-70 easement
Pinedale age glacial drift overlying Bull Lake glacial drift and Precambrian rocks, undivided.

Parcel S8: Sec. 12: NE 1/4 of SE 1/4 in I-70 easement
Pinedale age glacial drift overlying Bull Lake glacial drift and Precambrian rocks, undivided.

Parcel S10: Sec. 9: N 1/2 of N 1/2 of SW 1/4 of SW 1/4 of NW 1/4
Appears to be at a tectonically complex junction where a northwesterly-trending Precambrian block has been uplifted. The block is flanked by Minturn Formation dipped to the southwest parallel to the strike of the basement block.

T5S, R81W

Parcel S9: Sec. 1: Portion of Lot 13
Middle Pennsylvanian Minturn Formation overlain by Pleistocene Bull Lake glacial drift.

TOTAL EXHIBIT B 77.1 acres

SUMMARY:

Properties are primarily in Middle Pennsylvanian Minturn Formation which is overlain by Pleistocene glacial drift of Bull Lake and Pinedale age and by Holocene and Pleistocene alluvium (Tweto and Lovering, 1977) along Gore Creek. Descriptions of individual parcels above refer to Tweto and Lovering (1977).

The parcels are on either side of the axis of the northwest-trending Uncompahgre Uplift (Colorado Geological Survey, 1991).

There are no known mines, claims, prospects, or mining districts in the area (USGS, 1996; Davis and Streufert, 1990).

These properties do not lie within areas outlined as having mineral resource potential (Toth and others, 1993).

REFERENCES:

Colorado Geological Survey, 1991, Oil and gas fields map of Colorado: Colorado Geological Survey Map Series 26, scale 1:500,000.

Davis, M.W., and Streufert, R.K., 1990, Gold occurrences of Colorado: Colorado Geological Survey Resource Series 28, 101 p.

Toth, M.I, Wilson, A.B., Cookro, T.M., Bankey, Viki, Lee, G.K., Case, J.E., Dersch, J.S., 1993, Mineral resource potential and geology of the White River National Forest and the Dillon Ranger District of the Arapaho National Forest, Colorado: U.S. Geological Survey Bulletin 2035, 117 p.

Tweto, Ogden, and Lovering, T.S., 1977, Geology of the Minturn 15-Minute quadrangle, Eagle and Summit Counties, Colorado: U.S. Geological Survey Professional Paper 956, 96 p.

U.S. Geological Survey, 1996, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

REFERENCE NOT CITED:

Tweto, Ogden, Moench, R.H., and Reed, J.C., Jr., 1978, Geologic map of the Leadville 1 X 2 quadrangle, northwestern Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-999, scale 1:250,000.

LOCATABLE MINERAL REPORT FOR THE
MARVELLE COUEY (MUD SPRING) LAND EXCHANGE OFFER,
WHITE RIVER NATIONAL FOREST,
GARFIELD COUNTY, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

August 8, 1997

EXHIBIT C: Property that Marvelle Couey, et al., shall consider exchanging:

T3S, R92W, 6th Principal Meridian, Garfield County, Colorado:	acres:
Sec. 1 (part)	144.41
Sec. 12 (part)	14.59
Acreage Marvelle Couey, et al., will consider exchanging:	**159.00**

EXHIBIT D: Property that the U.S. Forest Service shall consider exchanging:

T3S, R92W, 6th Principal Meridian, Garfield County, Colorado:	
Sec. 12, portion (12 individual lots)	179.37
Acreage U.S. Forest Service will consider exchanging:	**179.37**

Total acreage	338.37

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Mud Spring Land Exchange (Triangle Spring 7 1/2', Leadville 1° X 2°)

According to the only available geologic mapping, at 1:250,000 scale, the entire area appears to be underlain by Pennsylvanian Minturn Formation which is a gray, pale-yellow, and red sandstone, grit, conglomerate, and shale with scattered beds and reefs of carbonate rocks (Tweto and others, 1978). Three north-northeast trending faults, each approximately 5 miles long, cut the area (Tweto and others, 1978). The eastern-most of the three appears to nearly bisect the land exchange.

No mineral deposits are known to occur in similar rocks within several miles of the area (U.S. Geological Survey, 1997a, b; Davis and Streufert, 1990). Other than a small area nearby in Leadville Limestone, no specific mineral deposit types were designated as having potential in the area (Toth and others, 1993). Thus, mineral potential on this tract is considered to be negligible.

References Cited:

Davis, M.W., and Streufert, R.K., 1990, Gold occurrences of Colorado: Colorado Geological Survey Resource Series 28, 101 p., 2 plates.

Toth, M.I., Wilson, A.B., Cookro, T.M., Bankey, Viki, Lee, G.K., Case, J.E., Dersch, J.S., 1993, Mineral resource potential and geology of the White River National Forest and the Dillon Ranger District of the Arapaho National Forest, Colorado: U.S. Geological Survey Bulletin 2035, 117 p.

Tweto, Ogden, Moench, R.H., and Reed, J.C., Jr., 1978, Geologic map of the Leadville 1 X 2 quadrangle, northwestern Colorado: U.S. Geological Survey Miscellaneous Investigations Series Map I-999, scale 1:250,000.

U.S. Geological Survey, 1997a, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997b, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

SOUTH DAKOTA

LOCATABLE MINERAL REPORT FOR THE KREITZ LAND EXCHANGE OFFER, BLACK HILLS NATIONAL FOREST CUSTER COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

August 27, 1996

EXHIBIT "A": Property that Lloyd and Sandra Kreitz shall consider exchanging:

Black Hills Meridian, South Dakota
T2S, R4E, Sec 31, Lot 6 (A portion of HES Vestal)
T3S, R4E, Sec. 6, Lots A and B of Lot 11 (A portion of HES Vestal)
T2S and T3S, R4E, Lots A and B of HES 311
(Total of 90 acres, more or less)

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

T3S, R4E, Black Hills Meridian, South Dakota
Sec. 6, Government Lots 17 and 20 and portions of Lots 18 and 21
(Total of 90 acres, more or less)

SUMMARY:

These properties are underlain by Early Proterozoic lower metagraywacke (DeWitt and others, 1989) composed of quartz-mica-feldspar schist and quartz-mica-garnet schist (Redden, 1968).

The nearest mines to these properties, the Pine Tree and Saginaw mines in the Atlantic Hill metallic mineral district (Wilson and DeWitt, 1995), are Early Proterozoic veins and shear zones with gold, silver, lead and minor amounts of zinc, copper, and arsenic that formed in a metamorphic and tectonic environment about 1.6-1.9 Ga. Hydrothermal solutions concentrated the metals in metasedimentary rocks (DeWitt and others, 1988 L). Much of the southern 3/4 of Sec. 6 is included in the Atlantic Hill metallic mineral district. Deposits in this district are expected to be veins with Ag, Au, and minor Pb, As, Cu (Wilson and DeWitt, 1995)

There may be a pegmatite prospect at the northern part of HES 311 Lot B (DeWitt and others, 1988; Redden, 1968). This prospect (#30 of Redden, 1968) is a beryl-bearing zoned pegmatite. Tourmaline is altered to muscovite in wall zones, especially in the hanging wall. Much of the beryl (which makes up less than 1 percent of the rock) is in "tapered shell crystals" (Redden, 1968). No other pegmatite bodies are mapped on the properties (Redden, 1968) and no other locatable resources are known to occur on the properties.

At 1:100,000 scale, Lot 6 and HES Lot A are within an area thought to have moderate potential for small to medium sized pegmatites with Sn and Li. The remaining property has high potential for small to medium pegmatites with pegmatite commodities except Sn. Easternmost parts of the properties, including HES Lot B have low potential for small vein deposits of Au and Ag (DeWitt and others, 1986, fig. 19).

REFERENCES:

DeWitt, Ed, Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral Resource Potential and Geology of the Black Hills National Forest, South Dakota and Wyoming: U.S. Geological Survey Bulletin 1580, 135 p.

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Berne 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-L, scale 1:24,000.

DeWitt, Ed, Redden, J.A., Buscher, David, and Wilson, A.B., 1989, Geologic Map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series I-1910, scale 1:250,000.

Redden, J.A., 1968, Geology of the Berne Quadrangle, Black Hills, South Dakota: U.S. Geological Survey Professional Paper 297-F, p. 343-408.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

LOCATABLE MINERAL REPORT FOR THE LARRY A. VICKERS LAND EXCHANGE OFFER, BLACK HILLS NATIONAL FOREST, CUSTER COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

August 27, 1996

EXHIBIT "A": Property that L.A. Vickers shall consider exchanging:

T2S, R7E, Black Hills Meridian, South Dakota
Sec. 30, Lot 3 (NW 1/4, SW 1/4) 35.24 acres

EXHIBIT "B": Property that the Forest Service shall consider exchanging:

T2S, R7E, Black Hills Meridian, South Dakota
Sec. 30, SE 1/4, SW 1/4 40.00 acres

SUMMARY:

These properties are underlain by Paleozoic sediments including the Lower Ordovician and Upper Cambrian Deadwood Formation, Lower Mississippian and Upper Devonian Englewood Formation, Lower Mississippian Pahasapa Limestone, and Lower Permian and Pennsylvanian Minnelusa Formation. The southwestern part of the property may be covered with Oligocene to Quaternary claystone, minor limestone, alluvium, colluvium, and terrace deposits (DeWitt and others, 1989; Darton and Paige, 1925).

North and northeast of these properties there are three unnamed Tertiary and Holocene stream placer deposits in Battle Creek, however, there are no placers upstream in the tributaries that cross these properties (DeWitt and others, 1988).

The properties are approximately one mile southeast of the Hugo metallic mineral district which has feldspar and mica deposits in the Harney Peak Granite (Wilson and DeWitt, 1995). However the Harney Peak Granite does not extend as far east as these properties (DeWitt and others, 1989).

No locatable resources are known to occur on either property. These properties were within areas considered to have moderate potential (at 1:250,000 scale) for high calcium limestone of medium size and for small Au (Sn, Ta) placers (DeWitt and others, 1986).

REFERENCES:

Darton, N.H., and Paige, Sidney, 1925, Central Black Hills, South Dakota: U.S. Geological Survey Geologic Atlas of the United States, Folio 219, 34 p.

DeWitt, Ed, Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral Resource Potential and Geology of the Black Hills National Forest, South Dakota and Wyoming: U.S. Geological Survey Bulletin 1580, 135 p.

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in parts of the Iron Mountain and Hayward 7 ½-minute quadrangles, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-N, scale 1:24,000.

DeWitt, Ed, Redden, J.A., Buscher, David, and Wilson, A.B., 1989, Geologic Map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series I-1910, scale 1:250,000.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series map I-2445, scale 1:100,000.

LOCATABLE MINERAL REPORT FOR THE
MARY LINDE LAND EXCHANGE OFFER,
BLACK HILLS NATIONAL FOREST,
CUSTER COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

April 28, 1997

EXHIBIT A: Property that Mary Linde shall consider exchanging:

T4S, R5E, Black Hills Meridian, Custer County, South Dakota:
Sec. 6, 7, & 8: Tract A — 79.9 acres

T4S, R3E, Black Hills Meridian, Custer County, South Dakota:
Sec. 9, 15, & 16: Tract Newell — 90.0 acres

Acreage Mary Linde will consider exchanging: **169.9 acres**

EXHIBIT B: Property that the U.S. Forest Service shall consider exchanging:

T4S, R4E, Black Hills Meridian, Custer County, South Dakota:
Sec. 26: Government Lots 6 (all) and 3 (portion) and portions of the S ½ of Sec. 26

Sec. 35: Portions of NW1/4NW1/4 and NE1/4NW1/4

Acreage U.S. Forest Service will consider exchanging: **170.0 acres**

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal: Tract Newell
Jewel Cave 24K

Large scale geologic maps of this area are lacking. A compilation of geology at 1:250,000 shows this tract is underlain by Lower Mississippian and Upper Devonian Englewood Formation and Lower Mississippian Pahasapa Limestone (undivided) overlain by Lower Permian and Pennsylvanian Minnelusa Formation (DeWitt and others, 1989).

The tract is about 1 ½ mi west of the mineralized districts that host early Proterozoic veins or pegmatites (Wilson and DeWitt, 1995) but it is included in an area assigned moderate potential for high-calcium limestone deposits (DeWitt and others, 1986). There is no known mineralization nor are there any claims on the tract. Mineral potential, in the absence of pegmatite, is expected to be low.

Non-Federal: Tract A
Cicero Peak 24K

Host rock (at 1:250,000) is mapped as early Proterozoic metaquartzite (DeWitt and others, 1989).

This tract is in an area assigned high potential for pegmatite deposits (DeWitt and others, 1986). The tract forms a horseshoe surrounding the White Mica mine (DeWitt and others, 1988), an Early Proterozoic mica pegmatite (Wilson and DeWitt, 1995). If, through careful mapping and inspection, pegmatite is found in this tract, the potential for additional deposits could be high.

Federal: Mayo School
Cicero Peak 24K

Host rock is Early Proterozoic upper metagraywacke (DeWitt and others, 1989).

This tract is within the Custer mineralized district which includes deposits of Early Proterozoic potassium feldspar pegmatite and potassium feldspar-mica pegmatite (Wilson and DeWitt, 1995). It is surrounded by small feldspar-bearing pegmatite bodies (DeWitt and others, 1988). The area was assigned high potential for pegmatite deposits (DeWitt and others, 1986). If, through careful mapping and inspection, pegmatite is found in this tract, the potential for additional deposits could be high.

SUMMARY:

Mineral potential of non-Federal Tract A is low although it should be examined carefully for the presence of high-calcium limestone outcrops. The remaining two tracts should be examined carefully for pegmatite bodies. If any exist, the potential for deposits could be high.

REFERENCES:

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Cicero Peak 7 ½-minute quadrangle and part of the Pringle 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-P, scale 1:24,000.

DeWitt, Ed, Redden, J.A. Redden, Buscher, David, and Wilson, A.B., 1989, Geologic map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000.

DeWitt, Ed; Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral resource potential and Geology of the Black Hills National Forest, South Dakota and Wyoming *with a section on* Salable Commodities, by J.S. Dersch: U.S. Geological Survey Bulletin 1580, 135 p, 4 pls. (scale 1:250,000) in pocket.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

OTHER INFORMATION SOURCES

U.S. Geological Survey, 1997, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

LOCATABLE MINERAL REPORT FOR THE CHRIS HUGO LAND EXCHANGE OFFER, BLACK HILLS NATIONAL FOREST, LAWRENCE COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

April 29, 1997

EXHIBIT A: Property that Chris Hugo shall consider exchanging:

T5N, R4E, Black Hills Meridian, Lawrence County, South Dakota:	acres:
Sec. 8, N1/2 SE1/4	80
Sec. 8, S1/2 SE1/4	80
Acreage Chris Hugo will consider exchanging:	**160**

EXHIBIT B: Property that the U.S. Forest Service shall consider exchanging:

T5N, R4E, Black Hills Meridian, Lawrence County, South Dakota:	
Sec. 17, SE1/4 SW1/4 and SW1/4 SE1/4:	80
OR	
Sec. 17, SE1/4 SW1/4 and S1/2 SE1/4:	120
Acreage U.S. Forest Service will consider exchanging:	**80 or 120**

Total acreage 240 or 280

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal: Chris Hugo
Deadwood North 24K

This tract is primarily in lower Permian and Pennsylvanian Minnelusa Formation which is composed of sandstone, solution breccia, limestone, and shale (DeWitt and others, 1986, fig. 13, p. 42-43; DeWitt and others, 1989).

No deposits are known to occur on this tract (DeWitt and others, 1988), but the Whitewood Creek placer district is about a mile to the north (Wilson and DeWitt, 1995) and the western part of the tract was included in an area assigned low potential for small gold-silver (lead zinc) vein or replacement deposits (DeWitt and others, 1986, fig. 24, p. 104-105).

Federal:
Deadwood North 24K

This tract is primarily in Lower Oligocene White River Group, a tuffaceous claystone and clay with minor limestone lenses (DeWitt and others, 1986, fig. 13, p. 42-43; DeWitt and others, 1989). At 1:100,000 scale, it isn't clear if Lower Mississippian and Upper Devonian Pahasapa Limestone and Englewood Formation (dolomitic limestone) and Lower Permian and Pennsylvanian Minnelusa Formation (sandstone, solution breccia, limestone, and shale) may be present.

No deposits are known to occur on this tract (DeWitt and others, 1988), but the Spruce Creek gold placer district is about 1/4 mi to the south (Wilson and DeWitt, 1995). The area was assigned moderate potential for both medium-sized high-calcium limestone deposits (DeWitt and others, 1986, fig. 24, p. 104-105) and for medium to small gold placers (DeWitt and others, 1986, fig. 18, p. 68-69)

SUMMARY:

No mines, claims, or prospects are on either property.
Neither property is within any of the metallic mineral districts.
Both properties were included in areas outlined as having mineral potential (at 1:250,000 scale) for various deposit types.
Unless a visit to the sites reveals obvious mineral deposits or indicators of them, the potential for deposits on these particular tracts is low.

REFERENCES:

DeWitt, Ed; Buscher, D.P.; Wilson, Anna B.; and Johnson, T.M., 1988, Map of mines, prospects, and patented mining claims, and classification of mineral deposits in the Deadwood North 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Open-File Report 87-0261B, scale 1:24,000.

DeWitt, Ed, Redden, J.A. Redden, Buscher, David, and Wilson, A.B., 1989, Geologic map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000.

DeWitt, Ed; Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral resource potential and Geology of the Black Hills National Forest, South Dakota and Wyoming *with a section on* Salable Commodities, by J.S. Dersch: U.S. Geological Survey Bulletin 1580, 135 p, 4 pls. (scale 1:250,000) in pocket.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

OTHER INFORMATION SOURCES

U.S. Geological Survey, 1997, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

LOCATABLE MINERAL REPORT FOR THE GLADYS RAVER LAND EXCHANGE OFFER, BLACK HILLS NATIONAL FOREST, PENNINGTON AND CUSTER COUNTIES, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

April 29, 1997

EXHIBIT A: Property that Gladys Raver shall consider exchanging:

T2S, R3E, Black Hills Meridian, Pennington County, South Dakota:

Secs. 16, 20, and 21 (HES 565)	125.57 acres
Acreage Gladys Raver will consider exchanging:	**125.57 acres**

EXHIBIT B: Property that the U.S. Forest Service shall consider exchanging:

T4S, R4E, Black Hills Meridian, Custer County, South Dakota:

Sec. 16:	Lot 2	5.88
	Lot 11 (partial)	+/- 15.00
	Lot 12*	13.45
	Lot 14*	3.59
Sec. 17:	Lot 8	35.24
	Lot 9	40.00
	Lot 10	9.50
	Lot 13	+/- 4.00
Sec. 21:	Lot 6*	10.69
Acreage U.S. Forest Service will consider exchanging:		**137.35 acres**

* If value of Federal land exceeds value of private land by greater than 25%, these lands will be dropped from exchange and pursued under the Small Tracts Act.

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal: Gladys Raver
Signal Hill 24K

Large scale geologic maps of this area are lacking. A compilation of geology at 1:250,000 shows that this tract along Bear Spring Creek is underlain by Lower Mississippian and Upper Devonian Englewood Formation and Lower Mississippian Pahasapa Limestone, undivided (DeWitt and others, 1989).

The nearest mineral deposits, Cenozoic Lead-Gold-Silver veins, are about 2 mi to the north in the Copper Mountain mineralized district (Wilson and DeWitt, 1995). There is no known mineralization nor claims on the tract. The area was assigned moderate potential for medium sized deposits of high-calcium limestone (DeWitt and others, 1986, fig. 19) and potential for any other deposit type is expected to be low.

Federal:
Berne 24K

This tract is in a complex area of Early Proterozoic metasedimentary rocks divided by the Grand Junction fault and subsidiary faults (Redden, 1968; DeWitt and others, 1986, 1989). Rock units exposed west of the Grand Junction Fault include three units of the Bugtown Formation: quartz-mica-feldspar schist, quartz-mica schist containing garnet, and meta-iron formation (Redden, 1968). Mica schist and quartz-biotite-garnet schist are mapped east of the fault (Redden, 1968). A number of pegmatite bodies are exposed in the mica schist unit east of the fault (Redden, 1968). Along Ruby Creek the bedrock is overlain by recent alluvium (Redden, 1968).

Nearly parallel, high angle, northwest-trending, faults merge with the nearly north-trending, down-to-the-east Grand Junction Fault north of the center of the tract. The Grand Junction fault then curves to the southeast along the western margin of the tract (see attached map, Redden, 1968).

The tract is bounded on the northeast side by the Custer Park No. 2 placer. At the south end it abuts the Oneonta (Mineral Hill), Friday, Minnie May mines and their associated claim blocks (DeWitt and others, 1988). There may be unidentified prospect pits on the tract (Redden, 1968; DeWitt and others, 1988).

The entire tract was assigned to a broad area of high potential for small to medium pegmatite deposits (DeWitt and others, 1986, fig. 19, p. 70-71). Specifically, the tract is within the Park metallic mineral district which includes deposits of Early Proterozoic potassium feldspar and mica pegmatites (Wilson and DeWitt, 1995). It is also immediately north of the overlapping Crow metallic mineral district which hosts Early Proterozoic gold-silver veins (Wilson and DeWitt, 1995). Although the tract is adjacent to the Custer Park No. 2 placer, placer potential was not identified in Ruby Creek in a previous resource assessment (DeWitt and others, 1986).

If, through careful mapping and inspection, pegmatite is found in this tract, the potential for additional pegmatite deposits could be high. In addition, stream gravels in Ruby Creek should be sampled and tested for potential placer gold deposits.

SUMMARY:

With the exception of moderate potential for high-calcium limestone, mineral potential of non-Federal tract is low.

The Federal tract has high potential for additional pegmatite deposits. Stream gravels should be tested for gold content.

REFERENCES:

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Berne 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-L, scale 1:24,000.

DeWitt, Ed, Redden, J.A. Redden, Buscher, David, and Wilson, A.B., 1989, Geologic map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000.

DeWitt, Ed; Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral resource potential and Geology of the Black Hills National Forest, South Dakota and Wyoming *with a section on* Salable Commodities, by J.S. Dersch: U.S. Geological Survey Bulletin 1580, 135 p, 4 pls. (scale 1:250,000) in pocket.

Redden, J.A., 1968, Geology of the Berne quadrangle, Black Hills, South Dakota: U.S. Geological Survey Professional Paper 297-F, p. 343-408, 3 pls. in pocket.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

OTHER INFORMATION SOURCES

U.S. Geological Survey, 1997, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

Redden, J.A., 1968, Geology of the Berne quadrangle, Black Hills, South Dakota: U.S. Geological Survey Professional Paper 297-F, p. 343-408, 3 pls. in pocket.

LOCATABLE MINERAL REPORT FOR THE
NED AND DORIS WESTPHAL LAND EXCHANGE OFFER,
BLACK HILLS NATIONAL FOREST,
CUSTER COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

April 30, 1997

EXHIBIT A: Property that Ned and Doris Westphal shall consider exchanging:

T5S, R4E, Black Hills Meridian, Custer County, South Dakota:	acres:
Secs. 4 and 5, HES 628	67.38
Secs. 8, 9, 16, and 17, part of HES 431	+/- 76.60
Secs. 16 and 17, Tract E of ES 650	15.62
Secs. 16 and 21, HES 432	69.49
(Subtotal	+/- 162)
Secs. 21 and 22, HES 488	80.00
Acreage Ned and Doris Westphal will consider exchanging:	**309.09**

EXHIBIT B: Property that the U.S. Forest Service shall consider exchanging:

T5N, R4E, Black Hills Meridian, Custer County, South Dakota:	
Sec. 19, E1/2 NE1/4:	80
Sec. 18, parts:	+/- 32
Secs. 7, 8, 17, and 18, parts	+/- 226
Acreage U.S. Forest Service will consider exchanging:	**+/- 338**

Total acreage +/- 647.09

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal: "Northern" 67 acre tract
Fourmile 24K

Detailed geologic mapping of the Fourmile quadrangle (Redden, 1963) indicates that outcrops are sparse in the area of this tract. The tract is almost entirely within Cambrian Deadwood Formation (conglomerate, sandstone, and glauconitic sandstone) and overlying Lower Mississippian Englewood Limestone (slabby pebbly lavender limestone). The creek bottom is covered with recent alluvium.

No mines, claims, or prospects are shown in this area (DeWitt and others, 1988). The tract is about 1 mi west of the Shirttail metallic mineral district (Wilson and DeWitt, 1995) which hosts a Cambrian paleobeach deposit (Black Hills Sand-Cliff) of high-purity, well-rounded silicon sand (DeWitt and others, 1988). That deposit is in an area of outcrop of Deadwood Formation, something lacking in the tract. The tract also is within or close to the margins of areas assigned moderate potential for high-calcium limestone and high potential for pegmatite deposits at 1:250,000 scale, yet the detailed geologic map at 1:24,000 scale doesn't support this.

In the absence of substantial Deadwood Formation outcrop, the resource potential of this tract is low.

Non-Federal: "Central" 162 acre tract
Fourmile and Argyle 24K

Based on the 1:250,000 geologic map (DeWitt and others, 1989) and extrapolating south of the Fourmile geologic map (Redden, 1963), this tract is very likely almost entirely within Pahasapa Limestone. Possibly Englewood and Deadwood Formations are exposed in the stream bed. It is also likely that recent alluvium is present.

No mines, claims, or prospects are shown in this area (DeWitt and others, 1988; Wilson and DeWitt, 1995). This area is within a broad region assigned moderate potential for high-calcium limestone at 1;250,000 scale. If sufficient outcrop exists, there could be potential for such a deposit on this tract, however, based on topography and distribution of outcrops in the limestone in the Fourmile quadrangle, the potential is probably low.

Non-Federal: "Southern" 80 acre tract
Argyle 24K

The tract is probably within the Mississippian Pahasapa Limestone and the Lower Permian and Pennsylvanian Minnelusa Formation (DeWitt and others, 1989).

This tract is within 1 mi of the western margin of the Argyle metallic mineral district which contains a number of high-calcium limestone deposits (Wilson and DeWitt, 1995).

Potential for resources on this tract is low.

Federal: 3 tracts
Fourmile and Argyle 24K

All three tracts are in Minnelusa Formation (Redden, 1963; DeWitt and others, 1989).

No mines, claims, or prospects are shown in this area (DeWitt and others, 1988; Wilson and DeWitt, 1995). The tracts are on the margin of an area assigned moderate potential for high-calcium limestone (DeWitt and others, 1986) yet there is no indication of deposits on these particular tracts.

The mineral potential for these three tracts is low.

SUMMARY:

No mines, claims, or prospects on any of the tracts nor are any within established metallic mineral districts. Unless a visit to the sites reveals obvious mineral deposits or indicators of them, the potential for deposits on these six tracts is low.

REFERENCES:

DeWitt, Ed; Buscher, David; Wilson, Anna B.; and Johnson, Tom, 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Fourmile 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-O, scale 1:24,000.

DeWitt, Ed, Redden, J.A. Redden, Buscher, David, and Wilson, A.B., 1989, Geologic map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000.

DeWitt, Ed; Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral resource potential and Geology of the Black Hills National Forest, South Dakota and Wyoming *with a section on* Salable Commodities, by J.S. Dersch: U.S. Geological Survey Bulletin 1580, 135 p, 4 pls. (scale 1:250,000) in pocket.

Redden, J.A., 1963, Geology and Pegmatites of the Fourmile Quadrangle, Black Hills, South Dakota: U.S. Geological Survey Professional Paper 297-D, p. 199-291, 3 pls. in pocket.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

OTHER INFORMATION SOURCES

U.S. Geological Survey, 1997, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

LOCATABLE MINERAL REPORT FOR THE DONALD L. SACHS LAND EXCHANGE OFFER, BLACK HILLS NATIONAL FOREST, PENNINGTON COUNTY, SOUTH DAKOTA

By
Anna B. Wilson
U.S. Geological Survey

August 12, 1997

EXHIBIT A: Property that Donald L. Sachs shall consider exchanging:

T1N, R4E, Black Hills Meridian, Pennington County, South Dakota:	acres
Sec 7, N 1/2 SE 1/4 and SE 1/4 SE 1/4	120
Acreage Donald L. Sachs will consider exchanging:	**120**

EXHIBIT B: Property that the U.S. Forest Service shall consider exchanging:

T4S, R4E, Black Hills Meridian, Custer County, South Dakota:	
Sec. 1, parts west of Highway #385	approx. 70
Acreage U.S. Forest Service will consider exchanging:	**approx. 70**

Total acreage approx. 190

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with other unpublished documents, personal communications, and professional experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Non-Federal: Sachs Property
Rochford 24K quadrangle

This tract is in Early Proterozoic metamorphosed shale, composed of phyllite, slate, and mica schist (DeWitt and others, 1989; Darton and Paige, 1925). Early Proterozoic metabasalt and iron-formation underlie this unit and crop out in the area (DeWitt and others, 1989) but at the scale of the available mapping, it isn't known if these occur within the tract.

The tract is on the southeast margin of the Rochford metallic mineral district (Wilson and DeWitt, 1995). All but the southeastern corner of the area that includes the Sachs tract was assigned high potential for medium-sized, syngenetic stratiform gold (±Ag, ±As) deposits (see DeWitt and others, 1986, fig. 16, area C7). Where the iron-formation (which includes the Rochford and Montana Mine Formations) is present there is high potential for precious metals (Au, Ag) in medium-size deposits. At the available mapping scale, it isn't known if iron-formation underlies the tract although it does crop out nearby. An unnamed mine (DeWitt and others, 1988b; Wilson and DeWitt, 1995, #399), presumably for deposits of this type (there is no record of production) is located on a block of claims about 2/3 mi to the west.

The tract is also on the northwestern end of the Castle Creek gold placer district (Wilson and DeWitt, 1995) but is well south of the stream valley where there might be potential for placer gold (DeWitt and others, 1986, fig. 16). The Rolland Longden (Au) placer (DeWitt and others, 1988b; Wilson and DeWitt, 1995, #399) is less than 1/4 mi. to the north. There is no record of any production from this site.

Federal Property
Hill City 24K

Geology of this area (Hill City quadrangle) was mapped and described by Ratté and Wayland (1969). The tract is in the central part of the Precambrian core of the Black Hills uplift. Precambrian rocks are chiefly folded pelitic phyllites and schists, and meagraywackes which are intruded the pegmatitic Harney Peak Granite. The intrusion forms the Harney Peak dome. The Federal property is on the northwest flank of the dome.

Three lithologic units of the Early Proterozoic Oreville Formation (Ratté and Wayland, 1969) underlie the tract. The rocks trend northeast along several nearly parallel fold axes. From northwest to southeast in the tract, the three units are 1) a muscovite facies of quartz-mica phyllite or schist supposedly from the upper part of the Oreville Fm., 2) a muscovite facies of quartz-mica phyllite or schist supposedly from the lower part of the Oreville Fm., 3) The Zimmer Ridge Member (psammite facies) which is mostly thick bedded to massive graywacke and then more of unit 2). Units 1) and 2) have been combined by DeWitt and others (1989) as metamorphosed tuffaceous shale. Unit 3) is included in the uppermost

graywacke (DeWitt and others, 1989). The eastern margin of the tract is overlain by Quaternary alluvium (Ratté and Wayland, 1969). Small pegmatite veins may crop out in the tract and vicinity.

The tract is less than 1/4 mi. east of the Olympia prospect (an Early Proterozoic tin-tungsten pegmatite) and Spring Creek (Sn, Au) placer district (Quaternary or Tertiary) (DeWitt and others, 1988a; Wilson and DeWitt, 1995). There are no known prospects nor pegmatite bodies mapped on the tract.

There is no known mineralization nor claims on the tract. The area is included in larger areas that were assigned high potential for large deposits of muscovite in Proterozoic muscovite schist and high potential for small deposits of Sn- or Li-pegmatite (DeWitt and others, 1986, pl. 2) at an assessment scale of 1:250,000. Mapping at 1:24,000 indicates no presence of pegmatite nor indications of extremely muscovite-rich schist on this particular tract. Thus, at 1:24,000 scale, mineral potential of this tract is low.

SUMMARY:

If iron-formation is found to exist within the Sachs tract, the mineral potential of the tract could be high although the probability of there being a substantial deposit is very low. Stream gravels, if any exist on the property, should be tested for gold content.

There are no known mineral deposits or claims on the Federal tract. The area is included in larger areas that were assigned high potential for large deposits of muscovite in Proterozoic muscovite schist and high potential for small deposits of Sn- or Li-pegmatite (DeWitt and others, 1986, pl. 2) at an assessment scale of 1:250,000. Mapping at 1:24,000 indicates no presence of pegmatite nor indications of extremely muscovite-rich schist on this particular tract. Thus, at 1:24,000 scale, mineral potential of this tract is low.

REFERENCES:

Darton, N.H., and Paige, Sidney, 1925, Central Black Hills, South Dakota: U.S. Geological Survey Geologic Atlas of the United States, Folio 219, 34 p., scale 1:125,000.

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988a, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Hill City 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-J, scale 1:24,000.

DeWitt, Ed; Buscher, David; Wilson, Anna; and Johnson, Tom, 1988b, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Rochford 7 ½-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-H, scale 1:24,000.

DeWitt, Ed, Redden, J.A. Redden, Buscher, David, and Wilson, A.B., 1989, Geologic map of the Black Hills area, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000.

DeWitt, Ed; Redden, J.A., Wilson, A.B., and Buscher, David, 1986, Mineral resource potential and Geology of the Black Hills National Forest, South Dakota and Wyoming *with a section on* Salable Commodities, by J.S. Dersch: U.S. Geological Survey Bulletin 1580, 135 p, 4 pls. (scale 1:250,000) in pocket.

Ratté, J.C., and Wayland, R.G., 1969, Geology of the Hill City quadrangle, Pennington County, South Dakota--A preliminary report: U.S. Geological Survey Bulletin 1271-B, 14 p., 1 pl. (scale 1:24,000) in pocket.

Wilson, A.B., and DeWitt, Ed, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2445, scale 1:100,000.

OTHER INFORMATION SOURCES:

U.S. Geological Survey, 1997a, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997b, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

WYOMING

LOCATABLE MINERAL REPORT FOR THE STATE OF WYOMING LAND EXCHANGE OFFER, BIGHORN NATIONAL FOREST, SHERIDAN, BIG HORN, AND JOHNSON COUNTIES, WYOMING

By
Anna B. Wilson
U.S. Geological Survey

February 6, 1997

EXHIBIT "A": Property that Wyoming State Land and Farm Office shall consider exchanging:

T56N, R87W, 6th Principal Meridian, Wyoming:
Sec. 28, W 1/2
Sec. 29
Sec. 30, SE 1/4; lots 3, 4, E 1/2 SW 1/4
Sec. 31, N 1/2 NE 1/4; lots 1,2, E 1/2 NW 1/4
Sec. 33, E 1/2
Sec. 34, SW 1/4
Skull Ridge and Dayton South 7 ½' Quadrangles, Sheridan County 1911.33 acres

T56N, R93W, 6th Principal Meridian, Wyoming:
Sec. 1, SE 1/4
Sec. 12, E 1/2 NW 1/4, W 1/2 NE 1/4
Medicine Wheel 7 ½' Quadrangle, Big Horn County 320 acres

Total acreage Wyoming State Land and Farm Office will consider exchanging: 2311.33 acres

EXHIBIT "B": Property that Forest Service shall consider exchanging:

T48N, R84W, 6th Principal Meridian, Wyoming:
Secs. 11, 13, 14, 23, 24
Caribou Creek and Hazelton 7 ½' quadrangles, Johnson County 3200 acres
(Note that one of the provided maps is in error: these sections are in Hazelton (not Hazelton Peak) and Caribou Creek quadrangles).

Total acreage Forest Service will consider exchanging: 3200 acres

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with unpublished documents and personal experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

Recent geologic mapping of these tracts is not available. There are several theses (which could not be obtained in timely fashion for this report) dating from 1953-1967. However, these have been incorporated into the 1:250,000 compilation of the Sheridan 1° X 2° quadrangle (Love and others, 1978). Much older geologic maps at 1:125,000 (Darton, 1906a,b) provided more detail and were useful in locating the tracts by sections. A short description of geology and mines in the Bighorn Mountains (Hausel, 1989, p. 34-42), provides a good overview of the region.

Sheridan County Tract: Offered Non-Federal Land on Skull Ridge and Dayton South 7 ½', Dayton 30', and Burgess Junction 30' X 60' quadrangles

Precambrian granite underlies most of this tract (Darton, 1906a; Love and others, 1978). The granite may be red or gray (1906a), the two colors merge into one another, but the mapping is insufficiently detailed to tell where this transition occurs. Along the northeast margin of the tract, there may be Cambrian Deadwood Formation unconformably overlain by Ordovician Bighorn Limestone. No mineralization is known to occur in similar rocks in the vicinity (U.S. Geological Survey, 1997).

Big Horn County Tract: Offered Non-Federal Land on Medicine Wheel 7 ½', Bald Mountain 30', and Burgess Junction 30' X 60' quadrangles.

This tract appears to be underlain by Mississippian Madison Limestone, Pennsylvanian Amsden Formation and Tensleep Sandstone, and Triassic Chugwater Formation (Darton, 1906a; Van Gosen and others, 1996). Because this area is about 15-20 miles southeast of the Pryor Mountains and known deposits occur in similar strata there, this area should be inspected carefully for uranium-vanadium solution-collapse breccia deposits (Van Gosen and others, 1996).

Johnson County Tract: Offered Federal Land on Hazelton and Caribou Creek 7 ½', Fort McKinney 30', and Buffalo 30' X 60' quadrangles.
(Note that one of the provided maps is in error: these sections are in Hazelton (not Hazelton Peak) and Caribou Creek quadrangles).

The tract is on the east flank of the Big Horn Mountains and appears (at 1:250,000 scale) to be in gray and red, mostly massive, Precambrian granite (Love and others, 1978; Darton, 1906b). Along the northeast margin of the tract, there may be Cambrian Deadwood Formation (buff sandstone, green shale, limestone, and limestone conglomerate) unconformably overlain by Ordovician Bighorn Limestone (massive, hard, cream colored limestone overlain by softer beds)

(Darton, 1906b). These rocks are draped with Quaternary sand, boulder, and gravel deposits (Love and others, 1978; assigned to Tertiary(?) by Darton, 1906b).

No locatable mineral deposits are known to exist on this tract (U.S. Geological Survey, 1996, 1997). However, gold and manganese were reported in veins in hornblende schist (Hausel, 1989, p. 39) at the Big Horn (Powder River) mine about 10 miles to the southwest of this tract. No detailed mapping was available to determine whether hornblende schist (amphibolite) is present in this tract. Work in progress by Kevin Chamberlain and students (University of Wyoming, Laramie) indicates that the rocks, all mapped as "granite", about 6 miles to the west, in the vicinity of Hazelton Peak, are an Archean bimodal volcanic suite. If so, there could be potential for massive sulfide and quartz vein deposits (T.L. Klein, U.S. Geological Survey, verbal communication, 2/3/97).

SUMMARY:

Available geologic mapping is at reconnaissance scale and is insufficient to assess the mineral resource potential of these small tracts with any certainty. Because there are no known mines or prospects in the immediate vicinity of the tracts, nor are there any prospects or mines within a few miles of these tracts in similar rocks, I assume that the mineral resource potential of these tracts is low. I would strongly suggest contacting both Dan Hausel (Wyoming Geological Survey, Laramie) for information on recent exploration activity, if any, in the area and Kevin Chamberlain (University of Wyoming, Laramie), for preliminary data on the age and composition of the "granite".

REFERENCES:

Darton, N.H., 1906a, Bald Mountain - Dayton [30' quadrangles], Wyoming: U.S. Geological Survey Geologic Atlas of the United States, Folio 141, scale 1:125,000.

Darton, N.H., 1906b, Cloud Peak - Fort McKinney [30' quadrangles], Wyoming: U.S. Geological Survey Geologic Atlas of the United States, Folio 142, scale 1:125,000.

Hausel, W.D., 1989, The Geology of Wyoming's Precious Metal Lode and Placer Deposits: Geological Survey of Wyoming Bulletin 68, 248 p.

Love, J.D., Christiansen, A.C., and Earle, J.L., 1978, Preliminary geologic map of the Sheridan 1° X 2° quadrangle, northern Wyoming: U.S. Geological Survey Open-File Report 78-456, scale 1:250,000.

U.S. Geological Survey, 1996, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1997, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

Van Gosen, B.S., Wilson, A.B., Hammarstrom, J.M., and Kulik, D.M., 1996, Mineral Resource Assessment of the Custer National Forest in the Pryor Mountains, Carbon County, South-Central Montana: U.S. Geological Survey Open File Report 96-256.

LOCATABLE MINERAL REPORT FOR THE CITY OF BUFFALO (TIE HACK) LAND EXCHANGE OFFER, BIGHORN NATIONAL FOREST, SHERIDAN AND JOHNSON COUNTIES, WYOMING

By
Anna B. Wilson
U.S. Geological Survey

August 15, 1997

EXHIBIT A: Property that the City of Buffalo will consider exchanging:

T55N, R86W, 6th Principal Meridian, Sheridan County, Wyoming:	acres:
Sec 21: parts shown on map provided (Huseman Property)	160

AND an exclusive easement over/across the following:

T55N, R86W, 6th Principal Meridian, Wyoming:
Sec. 15: S1/2 SW1/4
Sec. 16: SE1/4 SE1/4

Acreage City of Buffalo will consider exchanging: **160**

EXHIBIT B: Property that the U.S. Forest Service will consider exchanging:

T50N, R84W, 6th Principal Meridian, Johnson County, Wyoming:	
Sec. 23: SE1/4 SE1/4 SE1/4	10
Sec. 26: NE1/4, NE1/4 NW1/4	200

Acreage U.S. Forest Service will consider exchanging: **210**

Total acreage 370

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with other unpublished documents, personal communications, and professional experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

City of Buffalo (Huseman Property): (Beckton 24K, Burgess Jct. 100K, Sheridan 250K)

The Huseman property is underlain by Paleozoic sedimentary rocks and overlain by Quaternary (Holocene and Pleistocene) colluvium and alluvium (Hinrichs, 1980; Love and others, 1978; Darton, 1905, 1906a). The Paleozoic rocks strike NW and dip about 16-40° NE off the east flank of the Precambrian-cored Bighorn Mountains. Units underlying the property include Upper and Middle Ordovician Bighorn Dolomite, Upper and Lower Mississippian Madison Limestone, and Pennsylvanian Amsden Formation (Hinrichs, 1980).

No mineral deposits are known to occur in Paleozoic rocks in the area (U.S. Geological Survey, 1997; Darton, 1906a) although there are small deposits of gold and silver in the Goose Creek and Walker Mountain areas in the Precambrian granite (Hausel, 1989, p. 38-41).

Federal Land: (Hunter Mesa 24K, Buffalo 100K, Sheridan 250K)

The Federal tract is almost entirely within Precambrian granite. The most recent map of the area (Love and others, 1978) appears to have compiled the geology of this area directly from Darton (1905, 1906b). Darton's maps show two dikes (not shown on Love and others), probably diabase, in the general area.

Geologically, the site may be similar to the Roe Brothers group (sec. 15, T49N, R83W). There, dark colored dike rock cuts red granite and contains quartz, limonite, hematite, and a few isolated green copper stains. Assays showed a small amount of gold (Hausel, 1989, p. 41). Gold has been produced the basal Cambrian Flathead Sandstone (mapped as Deadwood on older maps) from the Kelly Creek area (T50N, R83W) a few miles to the southeast (Hausel, 1989, p. 40). No mineral deposits are known to occur in similar rocks in the area (U.S. Geological Survey, 1997; Darton, 1906b).

SUMMARY

There are no known mines, claims, prospects, or occurrences in similar host rocks in the area (U.S. Geological Survey, 1997; Hausel, 1989). Both properties have low mineral resource potential.

REFERENCES:

Darton, N.H., 1905, Geology of the Bighorn Mountains: U.S. Geological Survey Professional Paper 51, 129 p., scale 1:250,000.

Darton, N.H., 1906a, Bald Mountain - Dayton [30' quadrangles], Wyoming: U.S. Geological Survey Geologic Atlas of the United States, Folio 141, scale 1:125,000.

Darton, N.H., 1906b, Cloud Peak - Fort McKinney [30' quadrangles], Wyoming: U.S. Geological Survey Geologic Atlas of the United States, Folio 142, scale 1:125,000.

Hausel, W.D., 1989, The Geology of Wyoming's Precious Metal Lode and Placer Deposits: Geological Survey of Wyoming Bulletin 68, 248 p.

Hinrichs, E.N., 1980, Preliminary geologic map of the Beckton quadrangle, Sheridan County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-1218, scale 1:24,000.

Love, J.D., Christiansen, A.C., and Earle, J.L., 1978, Preliminary geologic map of the Sheridan 1° X 2° quadrangle, northern Wyoming: U.S. Geological Survey Open-File Report 78-456, scale 1:250,000.

U.S. Geological Survey, 1997, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

LOCATABLE MINERAL REPORT FOR THE
TE RANCH PARTNERSHIP LAND EXCHANGE OFFER,
SHOSHONE NATIONAL FOREST,
PARK COUNTY, WYOMING

By
Anna B. Wilson
U.S. Geological Survey
August 21, 1997

6th Principal Meridian, Park County, Wyoming

EXHIBIT A: Property that TE Ranch Partnership will consider exchanging:

	acres:
Parcel A:	
T46N, R104W, Sec. 36 (most)	
T45N, R104W, Sec. 1	
T46N, R103W, Sec. 31	
MS 413	220
Parcel B: Conservation Easement	
T56N, R105W, Sec. 6	
T45N, R104W, Sec. 1	
HES 49	136
Parcel C:	
T46N, R104W, Sec. 3	
MS 479	144
Parcel D:	
T50N, R104W, Sec. 6	
T50N, R105W, Sec. 1	
Trail easement:	1.8
Acreage TE Ranch Partnership will consider exchanging:	**501.8**

EXHIBIT B: Property that the U.S. Forest Service will consider exchanging:

Parcel 1:	
T50N, R105W, parts of Secs. 21 and 28	32.5
Parcel 2:	
T50N, R105W, Sec. 28, part	40
Acreage U.S. Forest Service will consider exchanging:	**72.5**
Total acreage	574.3

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These are occasionally augmented with other unpublished documents, personal communications, and professional experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents.

NON FEDERAL LANDS:

Parcel A: (Thermopolis 250K, The Ramshorn 100K, Francs Peak 24K)

Parcel A is near the south end of the Absaroka Mountains on the south side of the Meadow Creek granodiorite in the Kirwin district (Hausel, 1989). It extends from the summit of Chief Mountain, south to the Iowa mine, and is north of Galena Creek and Wood River. The parcel is underlain by the two members of the Upper Eocene and Lower Oligocene Wiggins Formation (Wilson, 1982), which is part of the Thorofare Creek Group, the youngest of three groups in the Absaroka Volcanic Supergroup (Antweiler and others, 1985). The Lower Member (Twilv) includes vent facies, "greenish-gray propylitized andesite flows and flow breccias" (Wilson, 1982). It is unconformably overlain by the Upper Member (Twiu) which "includes vent facies, gray and purple andesite flows and breccias that grade laterally ... into light gray rhyolitic to medium brown andesitic volcaniclastics and detached(?) or partially isolated reddish-brown andesite flows and brown channel-filled volcanic sandstones" (Wilson, 1982). "Crosby Breccia Member, an autobrecciated andesite containing blocks and lapilli of green andesite and light gray rhyolite, crops out at the base of the vent facies" (Wilson, 1982). The entire Wiggins Formation is intruded by andesite and dacite dikes (Wilson, 1982).

The Kirwin district is about 2-3 mi south of the parcel. Wilson (1964) recognized at least two different types of vein mineralization in the area: 1) pyrite-chalcopyrite-molybdenite-quartz veins in an altered and silicified zone and 2) galena-sphalerite-tetrahedrite (commonly silver-bearing) with minor pyrite-chalcopyrite in carbonate-quartz gangue. Wilson (1964) also recognized the signs of a buried copper-molybdenum porphyry and suggested the area be explored further. Significant disseminated copper-molybdenum resources related to buried intrusions in area extending from Kirwin to Galena Basin were studied by at least two mineral exploration companies in the 1970's (Terry Klein, U.S. Geological Survey, Personal Communication, 8/19/97).

The many mines in Canyon Creek, south of Parcel A, access the mineralized veins (type 2, above) on Galena Ridge, south of Galena Creek (Wilson, 1964). None of these mines is listed in MRDS or MAS (U.S. Geological Survey, 1997a, b). [Golden Ridge Tunnel (USGS topo map) between Canyon and Galena Creeks may be the Galena Ridge Tunnel (#2 on Wilson, 1964)]. It isn't known if these veins are related to the Kirwin deposits or the Brown Mountain Granodiorite (Hausel, 1989, p. 13).

The geology of Parcel A, as mapped at the surface (Wilson, 1982) is about the same as where the mines are along Galena Ridge. By analogy, mineral potential of this parcel could be high, especially if a buried intrusion is nearby. Disseminated deposits of Cu-Mo and veins of Ag, Pb, Zn may be present on or near the parcel. Carbonate-quartz gangue associated with the vein deposits may buffer drainage waters. It is not known if the quantity of carbonate is sufficient to neutralize the runoff.

Parcel B: (Cody 250K, Cody 100K, Beartooth Butte 62.5K, Windy Mountain 24K)

The easement parcel is along the Clarks Fork of the Yellowstone River. It appears to be in Precambrian granite and granitic gneiss overlain by quaternary alluvium (Pierce and Nelson, 1971). A NNE-trending fault (down to the north) probably bisects the parcel.

Other than sand and gravel pits, presumably in Quaternary morainal deposits, several miles to the west, no mines or prospects are known within the area (U.S. Geological Survey, 1997).

Parcel C: (Thermopolis 250K, The Ramshorn 100K, Francs Peak 24K)

Parcel C is about 4 miles north of Parcel A. It is located in the Gold Reef (also known as Jack Creek) district on the east side of Jack Creek, northeast of Francs Peak. The parcel is several miles north of the Meadow Creek granodiorite which is at the north end of the Kirwin district (Hausel, 1989). The 1,600 ft. Gold Reef Tunnel (Antweiler and others, 1985, p. 13) is in the SW part of the claim block. Little information on this "mine" could be located (U.S. Geological Survey, 1997a, b; Wilson, 1964, Hausel, 1989) but it probably is on claims staked for gold as early as 1894 (Antweiler and others, 1985, p. 10). One sample taken inside the adit showed high (as much as 420 ppm) bismuth concentrations (Antweiler and others, 1985, p. 13).

The parcel is in the Lower Member of the Wiggins Formation (Twilv; see parcel A for description) which grades laterally into brown andesitic volcaniclastics (Twila) of the alluvial facies (Wilson, 1982) and is unconformably overlain by the Upper Member (Twiu; see parcel A for description). Crosby Breccia Member, an autobrecciated andesite containing blocks and lapilli of green andesite and light gray rhyolite, crops out at the base of the vent facies (Wilson, 1982). The volcanics are intruded by a small dacite plug at the south end and a small andesite plug at the north of the parcel. Andesite and dacite dikes are mapped in the area, but not within the claim block. An east-trending fault may cut the southern part of the parcel (Wilson, 1982). Quaternary (Recent) unconsolidated deposits of silt, sand, gravel, and cobbles are exposed in the Jack Creek valley (Wilson, 1982).

Although the tract is on trend with the Kirwin district and the host rocks are similar, there is no known mineralization. The absence of alteration or mineralized veins suggests that the metal-bearing fluids similar to those that formed deposits in the Kirwin district have not affected the host rocks in this area. Thus, the mineral potential (for the same deposit types and commodities as Parcel A) of this tract appears to be moderate.

Parcel D: (Cody 250K, Carter Mtn 100K, Wapiti 62.5K, Twin Creek 24K)

The trail is primarily in nearly flat lying Eocene Willwood Formation (Twi) for all but the last 1/4 mi. where it crosses the Wapiti Formation. The Willwood forms badlands of varicolored clay, sandstone, and shale with some thin coal lenses; there is some conglomerate in lower part. At the west end, the trail crosses light colored volcanic sandstone, siltstone and conglomerate (Tws) and breccia (Twb) of the Wapiti Formation. Several late Tertiary andesitic dikes cut all three formations along or near the trail. The Hardpan fault with a right lateral component crosses the trail about 2/3 mi from the northwest end.

No mines, prospects, or mineral occurrences are known in similar rocks in the area (U.S. Geological Survey, 1997a, b; Antweiler and others, 1985). Mineral potential of these rocks is expected to be low. There is no mention in the rock unit descriptions if the Tertiary sedimentary rocks contain fossils.

FEDERAL LANDS:

Parcel 1: (Cody 250K, Ishawooa 125K, Carter Mtn 100K, Ptarmigan Mtn 24K)

Mapping of the Ishawooa quadrangle (Hague, 1899) shows this area as Cretaceous shale and sandstone. However, extrapolating from much more recent mapping at larger scale in the Wapiti quadrangle (Nelson and Pierce, 1969) immediately to the east, Quaternary alluvium and landslide material is much more likely. With the exception of borrow pits in the general area, there are no known mines, prospects, or occurrences nearby (U.S. Geological Survey, 1997a, b) However, on the basis of samples of Willwood Formation that contained as much as 200 ppm Mo and secondary Mo minerals, Antweiler and others (1985) outlined an area of moderate potential for Mo in sedimentary-type deposits about 1 mi to the southwest, between Bobcat and Ishawooa Creeks. Mineral potential on Parcel 1 is expected to be low.

Parcel 2: (Cody 250K, Carter Mtn 100K, Ishawooa 125K, Wapiti 62.5K, Ptarmigan Mtn 24K and Twin Creek 24K)

The eastern part of Parcel 2 is entirely within Quaternary alluvium (Nelson and Pierce, 1969). By extrapolation, the western part ought to be in the same, however, mapping at a much smaller scale (1:125,000) on the adjacent Ishawooa quadrangle, shows Cretaceous shale and sandstone (Hague, 1899). With the exception of borrow pits in the general area, there are no known mines, prospects, or occurrences nearby (U.S. Geological Survey, 1997a, b). However, on the basis of samples of Willwood Formation that contained as much as 200 ppm Mo and secondary Mo minerals, Antweiler and others (1985) outlined an area of moderate potential for Mo in sedimentary-type deposits about 1 mi to the west, between Bobcat and Ishawooa Creeks. Mineral potential on Parcel 2 is expected to be low.

SUMMARY:

Parcel A has high potential and Parcel C has moderate potential for hosting porphyry copper-molybdenum deposits as well as veins of Ag, Pb, Zn, ±Au. Availability of carbonate-bearing host rocks should be considered when examining runoff or planning mine drainage studies. Without sufficient carbonate to buffer the runoff, drainage from deposits in the volcanic units may be acidic.

Parcel B has low mineral potential. Any gravels should be checked for gold values, but no gold placers are known to exist in the vicinity.

Parcel D has low mineral potential. The slopes along the trail should be examined for stability as the Willwood Formation forms badlands.

Parcels 1 and 2 have low mineral potential. The gravels should be checked for gold values.

[10-9-97: Brad Van Gosen (U.S. Geological Survey, written and verbal communications, 10-8-97) has pointed out that the New World (Cooke City, MT) gold-skarn deposits occur in Cambrian limestone along the same structural-intrusive trend to the northwest. By analogy, if Cambrian limestone occurs beneath Parcels A and C, the potential for gold skarn could be high.]

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