

## **Idaho Geological Survey Memo**

TO: Glenwood Brittain, Julie Hopkins, and Jeff Hunteman, S-CNF  
FROM: Virginia S. Gillerman, Idaho Geological Survey  
SUBJECT: Idaho Geological Survey Minerals Information for Proposed Salmon-Challis Forest Plan Revision (with Wilderness Evaluation Areas)  
DATE: February 22, 2019

This summarizes the information on and is to accompany the GIS data and map attached. Arabic numbers (1 through 18) refer to specific blocks or polygons as labeled on the attached map, which is also provided as an ArcGIS coverage. Several recent maps showing general locations of yearly mineral exploration projects in Idaho were emailed to the Salmon-Challis (S-C) National Forest on February 11, 2019.

### **Introduction and General Comments**

Overall, the Salmon-Challis National Forest (S-C NF) is one of the most mineralized regions in Idaho, as indicated by mineral (principally metals) exploration over the past 30 years and by the large number of historic mines and prospects noted in the Idaho Geological Survey database (<https://www.idahogeology.org/webmap?show=mines> and DD-1) which lie within the Forest or adjoining land. As recognized by Congress in its discussions for the Central Wilderness Act of 1980, the region and S-CNF includes the unique Idaho Cobalt Belt (Polygon 1), a roughly 60-km long by 4-10 km wide northwest-trending belt of cobalt occurrences. Cobalt was then and is still a Critical Mineral as recognized today by federal Executive Order 13817. The Idaho Cobalt Belt contains the largest domestic cobalt resource in the nation and eCobalt's Idaho Cobalt Project is the country's only permitted primary cobalt mine plan. It is in the development stage. Several other cobalt exploration projects, including the advanced stage Iron Creek project, are also located within the Forest-designated Wilderness Evaluation Areas, even after withdrawal of the Blackbird Mountain/Leacock Point Focal Wilderness Area.

In addition to cobalt, the S-C Forest has been the site of a recent large gold mine (Beartrack mine at Leesburg in Polygon 2) and molybdenum mining at the Thompson Creek mine, in the headwaters of Thompson and Squaw Creeks near Polygon 15. While both those areas include private patented claims, they are partially to fully surrounded by the proposed Wilderness Evaluation Areas and covered by active mining claims. They include recent and historic mine disturbance and infrastructure. In recent years, there have also been small placer gold mines on BLM and next to Forest land near the Lemhi River valley (Kirtley Creek and elsewhere). There is potential for and recent (past 10 years) exploration for rare earth elements (REEs) in both the Beaverhead Mountains (Lemhi Pass district, Polygon 4), the Diamond Creek area, and near

Shoup (Ulysses Mountain, Dutchler Mountain region Wilderness Evaluation Areas in Polygon 3). Several sites in the Lemhi Range have seen exploration for tungsten and molybdenum (Polygon 8), as well as base metals. In short, almost all the S-C Forest area involved in the planning process has historic or recent mining activity and high to moderate mineral potential. The only exception is probably the crest of the Lost River Range. Specific areas with polygons denoted on the attached map and GIS layers are discussed below.

### **Specific Areas Indicated on GIS Map:**

#### Area Polygon 1: Very High Potential (Co, Cu, Au, others?)

Constitutes known Idaho Cobalt Belt that includes current development and exploration projects, as well as historic prospects, for cobalt, gold, copper, and probably rare earths. Blackbird Mining district and others on the trend host nation's only domestic cobalt resource. Cobalt is a critical mineral.

Cobalt has always been an essential component for superalloys and its current use in rechargeable batteries, coupled with a global source dominated by the Congo, makes it a strategic and critical mineral for the U.S. The Salmon-Challis National Forest is the location of the Idaho Cobalt Belt with the largest domestic cobalt resource in the country. eCobalt's Idaho Cobalt Project, in the Salmon-Challis Forest is the nation's only permitted primary cobalt mine plan; it is in the development stage. Several other current cobalt exploration projects are also located within the Wilderness Evaluation Areas.

- Idaho Cobalt Belt: The belt is a northwest-trending zone of cobalt-bearing mines and prospects about 60 kilometers long by 4 to 10 kilometers wide. The belt extends from the Salmon Canyon Copper mine on the northwest end through the Clear Creek Special Management area and the Blackbird Mining District, and beyond to the Iron Creek deposit on the southeast end of Polygon 1 on the attached map. The belt is underlain by a specific sequence of ancient sedimentary rocks. The copper-cobalt-gold mineralization is solely in those rocks, which are largely siltstones to schists. The formerly producing Blackbird mine site is still in a remediation phase, and it hosts an unmined Cu-Co resource of about 18 million tons. Blackbird mine is located at the widest part of the Cobalt Belt with the now-eliminated Blackbird Mountain Focal Wilderness Evaluation Area just to the northwest. In 2018, about 5,000 new claims were staked along the belt. eCobalt's RAM deposit, which is in the development phase for an underground mine and mill, lies adjacent to the Blackbird patented claims. Other companies, including ePower Metals and International Cobalt, have announced promising grass-roots discoveries based on field-based soil and rock chip sampling. That is the first step of any exploration process and it is too early to tell if they might represent major deposits. At the southeast end of the zone, First Cobalt has a large drilling program at the Iron Creek property,

which includes two existing adits. Favorable results have identified multiple zones of copper-cobalt ore and a significant resource; the company is planning additional work. Several other companies are also working in the region. In December, 2018, the Forest Supervisor removed the Blackbird Mountain and the Leacock Point Focal Wilderness Areas from consideration due to their location in the Idaho Cobalt Belt and federal Executive Order 13817, the policy to reduce the Nation's "*vulnerability to disruptions in the supply of critical minerals ...*" as well as possible fire management concerns.

Wilderness and other management closures make it more difficult for any of these companies to raise capital, plan infrastructure needs, or conduct permitting, exploration, and environmental activities. As marked on the map, there are also scattered cobalt prospects in the northern Lemhi Range, one of the Focal Wilderness Evaluation Areas. The southeastern part of the Cobalt Belt is still included within the apparently lower-priority Wilderness Evaluation Area in several parcels, including Cobalt, Taylor Mountain, Lake Mtn. East, and Sheephorn Mtn., according to the Forest Service map. The northwest section of the Idaho Cobalt Belt was designated as a "Special Mining Management Zone – Clear Creek" in June 1980 under the Central Idaho Wilderness Act of 1980 (Public Law 96-312, 94 Statute 948) wherein "*prospecting and exploration for, and development or mining of cobalt and associated minerals shall be considered a dominant use of the land ....*" Congress noted the strategic importance of cobalt and the Idaho Cobalt Belt in 1980, and it is equally correct today.

#### Area Polygon 2: Very High Potential (Au, Ag, Cu, others)

Includes Leesburg, Beartrack mine, and Arnett Creek areas of active gold exploration and past mining. Includes numerous properties currently and in the past being explored for gold and other commodities located along the Panther Creek – Napias Creek linear.

#### Area Polygon 3: High Potential (Au, REEs, Co, U, base metals, and other alloy and rare metals)

Includes areas of active gold exploration and past mining at Shoup, Ditch Creek, Gibbonsville, and elsewhere, the REE and Nb-bearing rutile occurrences west of North Fork in vicinity of Ulysses Mountain and Dutchler Mountain (see IGS Pamphlet 115, 1958), REE prospects and veins at Diamond Creek, the Bobcat Gulch porphyry Cu-Mo, and other smaller gold and metallic districts. The polygon lies on both sides of the Salmon River between Idaho Cobalt Belt and the Montana state line to the north and encompasses major tourist-accessed paved roads along the river and dirt roads within the mountains. Rare earths (REEs) and some of the alloy metals are also critical minerals.

#### Area Polygon 4: High Potential (REEs, Au, Mo, Cu, base metals)

Includes the very north end of the Lemhi Range and west flank of the Beaverhead Range, including the Lemhi Pass REE-Th district, and the base metal deposits at Leadore. Both areas were explored only a few years ago, are still of high interest, and have significant potential.

Lemhi Pass is unique in hosting neodymium-rich monazite-bearing deposits. The neodymium is prized for its use in high-tech magnets and battery components. Rare earths have increasing value in multiple electronic applications.

Area Polygon 5: Moderate Potential

South Beaverheads host base metals at Nicholia and a variety of other scattered prospects in an area of little-known geology.

Area Polygon 6: High Potential (Cu, Au, F)

Remote area next to wilderness hosts Yellowjacket mine, which was a small producer about 30 years ago and significant fluorspar deposits at Meyers Cove. Fluorspar is a designated critical mineral used in aluminum and steel production and chemical processes.

Area Polygon 7: Moderate Potential (base and alloy metals?)

Complex geology with some alteration and a few prospects in northern part of Lemhi Range.

Area Polygon 8: High (W, Mo, Cu, base metals, Au)

Includes Ima mine, a significant tungsten and molybdenum deposit with exploration drilling about 10 years ago. Central Lemhi Range has visible large hydrothermal alteration zones. There are multiple carbonate replacement deposits of Pb-Zn-Ag at Gilmore, a historic district and town.

Area Polygon 9: Moderate (base and precious metals)

South Lemhi Range has a number of historic prospects mined for silver and base metals. Deserves more exploration.

Area Polygon 10: Low

This area is primarily the West Fork Morgan Plus block. Few prospects known.

Area Polygon 11: Low

The north end of the Lost River Range has few historic prospects.

Area Polygon 12: Moderate to Low (Au, F, other?)

Small prospects located near the Lost River range front.

Area Polygon 13: Low

Lost River Range crest area has low potential for mining.

Area Polygon 14: Low

Includes South Lost River Range, with very few prospects known.

Area Polygon 15: High (Au, Ag, U, base metals, F, Mo, others?)

Area north of Stanley and east including the Yankee Fork and Custer mining districts. Site of active gold mines about 25 years ago and numerous historic precious metal mines. The giant Thompson Creek molybdenum mine is adjacent or within the boundaries of the wilderness evaluation area. In addition, the Custer Motorway, Bayhorse townsite (an Idaho Department of Parks and Recreation site), and the Yankee Fork area annually host numerous tourists interested in the mining history of the area. Currently on care and maintenance, the Thompson Creek mine still hosts a large resource and in the past was a major source of employment in Custer County. It will resume operations when Mo prices improve.

Area Polygon 16: Moderate (Au, Ag, base metals, Mo, F, others)

Includes part of the Pioneer Mountains and Copper Basin areas of multiple historic base and precious metal mines and prospects. Many others are already included in wilderness within this area.

Area Polygon 17: Low

Several small focal wilderness evaluation areas adjoin existing wilderness and appear to have few if any mineral prospects.

Area Polygon 18: High (Cu, Zn, Ag, Au, Pb, Mo, others)

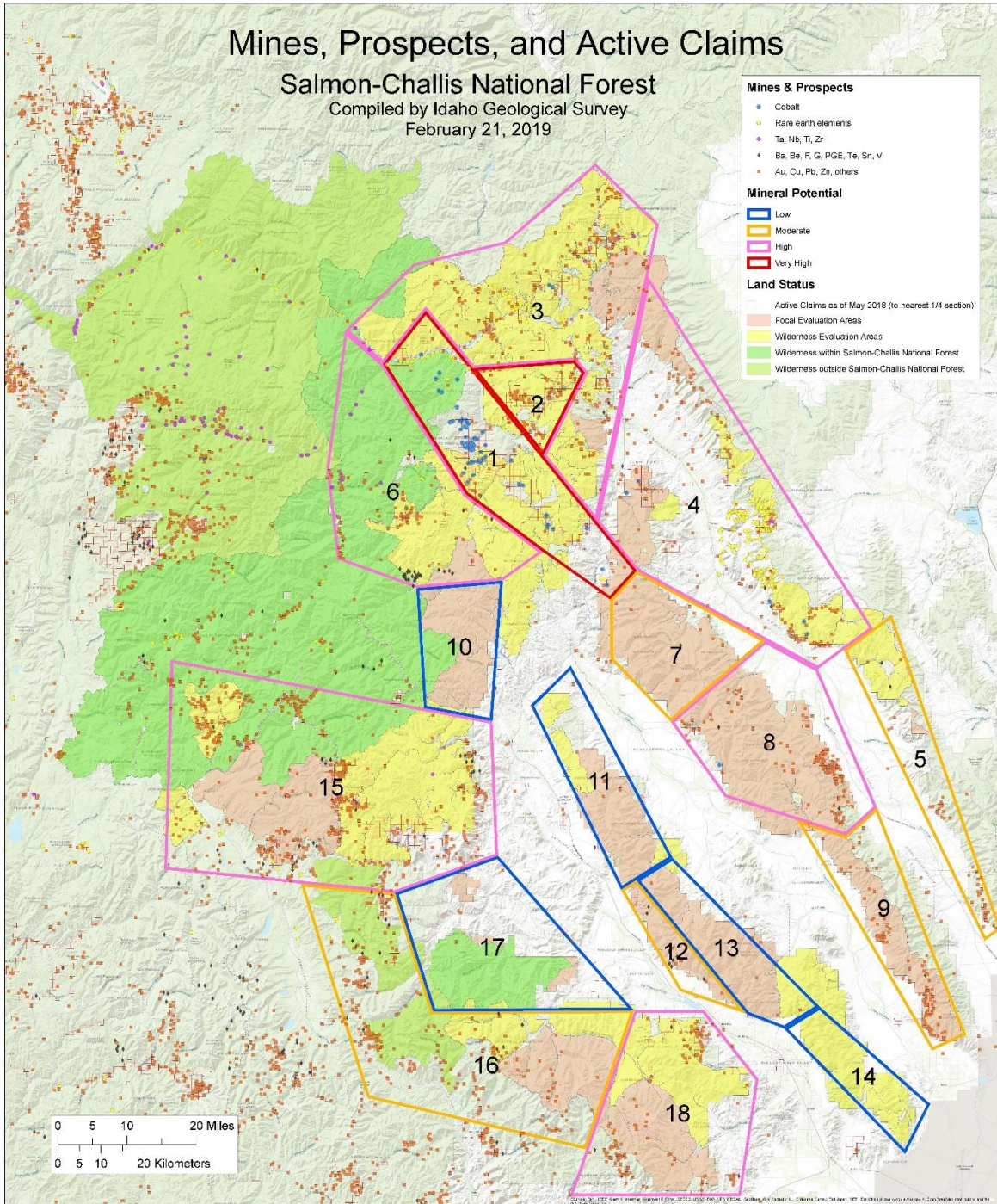
This polygon includes the Empire Mining District west of Mackay and site of a currently active exploration program. Many historic prospects and high potential exists on the west side of the White Knob and Pioneers also. Copper Basin and the North Slope Pioneers areas host both recreational attractions and historic mines.

## **Summary and Conclusions**

The list of polygons and their mineral potential, and a copy of the map, as well as a list of selected references are attached to this memo.

In summary, the only evaluation areas of low mineral potential are The West Fork Morgan Plus tract, the crest of the Lost River Range, and the small focal evaluation areas (Spud Creek, JMJP, and Burnt Creek Big Lost) adjacent to the wilderness. The rest of the evaluation areas, including the focal evaluation areas, have moderate to high mineral potential. In particular, the Lemhi and Beaverhead ranges, the Yankee Fork mines, and the large region from the Cobalt Belt northeast across the Salmon River and into Montana have high mineral potential and active exploration. Keeping those large areas under multiple use, as Congress intended, will allow regulated

exploration and mineral development for critical minerals and other metals, as well as other economic activities and recreational use for the public.



<b>Salmon-Challis Forest Plan Mineral Potential Polygons</b>			
Idaho Geological Survey Assessment of Mineral Potential			
<i>Explanation to Accompany GIS Map</i>			<i>2/19/2019</i>
<b><u>Polygon Label</u></b>	<b><u>General Location</u></b>	<b><u>Mineral Potential</u></b>	<b><u>Forest Service Evaluation Areas Included</u></b>
1	Idaho Cobalt Belt	Very High	Blackbird Mtn., Leacock Pt., Cobalt, Porphyry Ridge, Taylor Mtn., Sheephorn Mtn.
2	Panther Creek Fault Trend	Very High	Leesburg, Salmon River Breaks S., Cobalt, Phelan Mtn., Daly Creek
3	Shoup, North Fork	High	Salmon River Breaks N., Ulysses Mtn., Donnelly Gulch, Gibbonsville East, Anderson Mtn., Indian Peak
4	Beaverheads, Lemhi Valley	High	Stein Mtn., Goldstone Mtn., Upper Flume Creek Lemhi, Haynes Creek Lemhi, North Lemhi Range
5	South Beaverheads	Moderate	Grizzly Hill, Beaverhead Divide, Wheetip Creek, Horsethief
6	Wilderness, Yellowjacket, Meyers Cove	High	Yellowjacket
7	North Lemhi Range	Moderate	North Lemhi Range
8	Central Lemhi Range	High	North Lemhi Range
9	South Lemhi Range	Moderate	South Lemhi Range
10	Castle Lakes	Low	West Fork Morgan Plus
11	North Lost River Range	Low	Grouse Peak, Pahsimeroi Mtns., Spring Hill
12	Lost River Range Front	Moderate	Spring Hill
13	Lost River Range	Low	Borah Plus
14	South Lost River Range	Low	Sunset King, Howe Peak, Jumpoff peak
15	N. of Stanley, Yankee Fork, Custer	High	S. Cabin Creek Peak, South Motorway, North Motorway, Spring Basin Squaw, Copper Mtn., Lola Creek
16	Wilderness, Copper Basin, Big Lost, Pioneers	Moderate	N. Fork Big Lost, Porphyry Peak, Copper Basin, North Slope Pioneers, South White Knobs
17	Wilderness, Burnt Creek, Big Lost area	Low	Spud Creek, JMJP, Burnt Creek Big Lost
18	Mackay, Copper Basin	High	N. Slope Pioneers, South White Knobs, Copper Basin

### **Selected References: Salmon-Challis National Forest and Idaho Cobalt Belt**

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- U.S. Department of Energy, 2010, Critical Materials Strategy: U.S. DOE report, 165 p. ([www.arpa-e.energy.gov](http://www.arpa-e.energy.gov))
- And numerous other works on specific mining districts in the Salmon-Challis Forest*