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INVENTORY OF WASHINGTON MINERALS

PART II METALLIC MINERALS

By
MARSHALL T. HUNTTING

Volume 1 - TEXT
Volume 2 - MAPS



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INVENTORY OF
WASHINGTON MINERALS

PART II
METALLIC MINERALS

Volume 1 -- TEXT

FOREWORD

Knowledge of the occurrence of minerals in Washington has been accumulating steadily since 1853, when the first mine (a coal property) was developed. Actually it antedates this, for the discovery of a coal outcrop was recorded as early as 1833, though 20 years elapsed before any particular attention was paid to mineral resources, and it was not until about 1860 that State-wide prospecting, at first for gold, was well underway. The early published references to mineral discoveries are, in general, vague and chiefly of historical value, but some are useful in describing deposits that have been forgotten or lost during the passage of years.

In 1890 the office of State Geologist was created by the State Legislature, resulting in the first coordinated effort to catalogue our mineral resources and possibilities. This work was discontinued after two years, but was resumed in 1901 through the establishment of the Washington Geological Survey and has been continuous since then.

During the 90 years or more that prospecting and mining have been active, a vast amount of information has been obtained on the minerals of the state. The literature on the subject is voluminous. The U. S. Geological Survey, U. S. Bureau of Mines, and many other agencies, as well as institutions, organizations, and individuals, have contributed extensively to the fund of published data. Also, mining journals and periodicals, many of which are no longer published, have carried useful accounts of old operations and mineral discoveries.

More than 100 bulletins and reports on geology and mineral resources have been published by the Division of Mines and Geology and its predecessor agencies. Additional material available to the Division has been unpublished, existing as personal observations of staff members and, particularly, as notes from many years of field investigations. All these sources of information can be consulted—and commonly are—when given resources are considered, but searching the literature is a time-consuming task.

To make desired data on industrial minerals and operations more readily available for Divisional use, a card catalogue of all known nonmetallic-mineral references

was compiled many years ago by the writer. It gave only brief details of individual deposits, but these, with their citations to further information, became of inestimable value. An immediate use was in the preparation of Bulletin 33, "Nonmetallic Mineral Resources of Washington," published in 1936. Since then the catalogue has been steadily added to by staff members as new information has been obtained, and a similar card file was started for metallic minerals and their operations. This last has been a laborious undertaking, for which Everett P. Hougland, formerly of the Divisional staff, was originally responsible. Later, it was materially added to by Grant M. Valentine, also a former member of the Divisional staff, and was greatly expanded and organized into usable form by Marshall T. Huntting.

The present "Inventory of Washington Minerals" is the result of a considered conviction that the data in these card catalogues would be as useful to the mining industry as they have proved to be to the Division of Mines and Geology and should, therefore, be made available to all who are, or may become, interested in Washington's mineral resources. The listings are purposely made as concise as possible, yet giving certain essential facts. They may be used in obtaining brief general information about any mineral resource, or they may be used as a starting point for detailed investigations. Upon completion of the section dealing with nonmetallic minerals it was considered desirable to publish that material without delay as Part I of the "Inventory." The first printing was in 1949, Grant M. Valentine being in charge of the compilation.

Immediately thereafter work was begun on Part II, which deals with metallic mineral occurrences. This has proved to be a far more elaborate and lengthy project than was foreseen. However, it is believed that the time and expense involved are justified and that the mining industry will find that having this material readily available for reference will fill a real need.

SHELDON L. GLOVER, Supervisor
Division of Mines and Geology

October 10, 1956

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INVENTORY OF WASHINGTON MINERALS

PART II—METALLIC MINERALS

By MARSHALL T. HUNTING

INTRODUCTION

PURPOSE OF THE REPORT

The primary purpose of this report is to present a brief annotated list of all the metallic mineral occurrences in Washington known to the Division of Mines and Geology. The desirability of making available to the public a large amount of unpublished data in the Division files has long been recognized, and this report includes all this previously unpublished information as well as a summary of all the available published data on metallic mineral occurrences in the state. Through the use of maps it is possible to show the distribution of the various minerals, and in the text the individual deposits are briefly described and also referenced—thus providing the reader with a convenient foundation for a more comprehensive study of any metal in its various mineral forms or of any specific mine or prospect in the state.

An effort has been made to include in this inventory all the metallic mineral occurrences known in the state, even though many of the deposits are obviously of negligible value. This has been done because in the past many mineral occurrences which have been considered to have no importance have, for one reason or another, later proven to be of considerable value. This is a situation which, because of increasing demand for metals, new technological developments, and improved ore-finding techniques, may be expected to develop even more frequently in the future.

The title of this report is actually somewhat a misnomer, as this is really an inventory of the occurrences of the various metals in their mineral forms rather than of the minerals themselves. This may appear to be splitting hairs, but the point is, by using this report a person may look up all known occurrences of copper in Washington but he could not readily find all the occurrences of any given copper mineral.

ACKNOWLEDGMENTS AND SOURCES OF INFORMATION

This report is strictly a compilation, although many of the data included have never been previously published. Some of the most important sources of data used for this inventory are the published reports of various private, State, and Federal agencies. Another valuable source is the large mining-properties card file of the Division of Mines and Geology and its three predecessor organizations, the Washington Geological Survey, the Division of Geology, and the Division of Mines and Mining. Perhaps the largest contribution from these files is material accumulated over a long period of years from all the available mining and geology periodicals. Other sources are the many volumes of unpublished Division field notes, the files of other State agencies, questionnaires, and unpublished private reports.

The writer was fortunate in being allowed to include much nonrestricted material from the files of the U. S. Geological Survey and the U. S. Bureau of Mines. Unavoidably, the extent of this assistance is not fully acknowledged by the individual property references, but the contribution comprises a large amount of accurate up-to-date information about many of the best described properties. These valuable sources of information were generously made available by Mr. M. E. Volin, formerly Chief of the Mining Division, Region II, U. S. Bureau of Mines, and by Mr. A. E. Weissenborn, Regional Geologist of the Spokane office of the U. S. Geological Survey. The assistance of Mr. Henry Hoard, mining deputy in the Whatcom County Assessor's office, in furnishing information on many Whatcom County properties is gratefully acknowledged.

General data on the properties, uses, production, prices, ore minerals, and geology of the various metals were abstracted from numerous standard texts on chemistry and economic geology, from Information Circulars and Minerals Yearbooks of the U. S. Bureau of Mines, Mineral Resources of the U. S. Geological Survey, the Engineering and Mining Journal Metal and Mineral Markets, and, for some metals, from books dealing specifically with those metals. These various sources were not always in agreement in many particulars, and in such instances the most recent or what was believed to be the most reliable data were used.

To Mr. Grant M. Valentine, now District Geologist for the Shell Oil Co. and formerly on the Division staff, credit is due for the organization and a large part of the compilation of this report. His contribution to this inventory is at least as great as that of the writer, but since he had no hand in the final stages of its preparation, the writer accepts all responsibility for any shortcomings that may be noted, and at the same time gives credit to Mr. Valentine for his tedious months of compilation. To Mr. Sheldon L. Glover, Supervisor of the Division of Mines and Geology, the writer is grateful for aid in the preparation of the report.

PLAN OF THE REPORT

As in Part I of the Inventory of Washington Minerals, the data in Part II are presented in two forms—maps and text. Here in Part II, however, the maps and the text are bound in two separate volumes, so that descriptive material and corresponding map may be studied together with the least possible inconvenience to the reader.

In the text (Volume 1) the metals are arranged alphabetically; under each metal the occurrences are grouped by counties which are arranged alphabetically; and under each county they are arranged similarly by property name. Properties about which some information is known but in which the kind of ore is not known are grouped under

a separate heading following the metals. At the end of Volume 1 is a property index in which all properties are listed alphabetically.

The maps (Volume 2) are likewise arranged alphabetically by metals, with a separate map at the end for properties whose ores are not known. However, since some metals are found in only a few known occurrences in this state, some of the maps are combined to show the occurrences of several metals, thus putting some of the metals slightly out of place alphabetically in the map sequence. For example, one map shows occurrences of bismuth, cadmium, cerium, columbium, and tantalum—the latter two being mapped together because of their very close chemical relationship and their close association in nature. Bismuth, cadmium, and cerium are shown on the same map merely for printing economy. Cobalt and nickel are shown on a single map also because of their close chemical alliance and physical association. Printing economy dictated the combining of platinum, selenium, tellurium, and thorium on one map; tin and titanium on another; and uranium, vanadium, and zirconium on another. On the other hand, lode gold and placer gold deposits are described in separate sections in the text and are shown on separate maps to better differentiate the two types of deposits.

Most metallic-mineral properties have more than one metal in their ores, and as this inventory lists all known occurrences of all the metallics in the state, the names of most of the properties appear under several headings in the report, and the properties are shown on several maps. However, each property is described in only one place—under the heading which represents what is believed to be the most important constituent of the ore. For example, the Holden mine in Chelan County is described under copper and is shown on the copper map. It is assigned a number (40) which follows the name in the copper section of the text and is adjacent to the symbol for the mine on the copper map. (On the copper map all properties which are described under the heading "Copper" in the text are shown by a cross "+", and all properties which have some copper, but in which other metals account for the principal values, are shown by a large dot "•". Most of the other maps use these symbols with the same meanings.) However, the Holden mine also produces zinc, gold, and silver, so it is shown on each of these maps, and the name appears in its proper alphabetical position under each of these headings in the text, but following the name in each of these sections is simply a notation "(see under copper)". The number (51) assigned to the Holden mine on the gold map and in the text under gold is not the same as that given the same property under any of the other headings where it may be found, but the number given each property on any given map is the same as the number given the same property in the corresponding section in the text.

Some of the occurrences described in the text do not have a map number and are not shown on any map, because their locations are too inexactly known.

To facilitate following a numbered symbol on a map (in Volume 2) to the description (in Volume 1) of the property represented by the symbol, a finding list (nu-

merically arranged) relating number to property name is on the page facing each map.

The scale of the state maps is such that they can be regarded as index maps only. Locations of the properties are given as precisely as possible in the text, but because of the small map scale, the detail is not as great as it would be on larger scale maps. In order to show the location of all the occurrences in some areas it is necessary to allow a single symbol to represent several closely spaced properties. Even this device leaves some of the small-scale state maps so cluttered with symbols in some areas that there is insufficient room for the identifying numbers. Where this is true, special larger scale county maps are used. These are the maps for copper, gold, lead, silver, and zinc for Stevens County, and for lead and zinc for Pend Oreille County.

PROPERTY DESCRIPTIONS

This inventory is of course subject to the limitations and shortcomings that are inherent in any compilation of this sort in which use is made of a wide variety of sources of information. The critical reader will probably find inaccuracies; many mines and prospects are inadequately described; and others are perhaps described more than adequately—that is, they may be presented in a more favorable light than their merits justify. Very determined effort has been made to avoid these shortcomings, to eliminate duplications, and to make the data as complete and up to date as possible. The only way many of the remaining errors can be corrected is through the active cooperation of the readers. Your corrections and additions are earnestly solicited.

The reader will note that the placer properties are nearly all very inadequately described. This results from the fact that very little has been written about the placers in Washington, which in turn reflects the comparative unimportance of the state's placers. Many of the placer properties had suspended operations before their existence became generally known.

For the reader's convenience the occurrences are described under a standardized set of 14 headings: **Loc** (location), **Elev** (elevation), **Access**, **Prop** (property), **Owner**, **Ore**, **Ore min** (ore minerals), **Gangue**, **Deposit**, **Dev** (development), **Improv** (improvements), **Assays**, **Prod** (production), and **Ref** (references). A date in parentheses following any information in the descriptions indicates the date at which that information is assumed to be correct.

Under **Loc** (location) the position of the deposit is designated, wherever possible, by legal land description, and usually by some supplemental information which relates the location to some geographic feature, and further, the so-called "mining district" is usually given. The legal description is abbreviated; thus, sec. 3, (40-25E) indicates section 3, Township 40 North, Range 25 East, Willamette meridian.

Under **Elev** (elevation) is the altitude in feet above sea level, and in some instances the distance above local valley level is also given.

Under **Access** the distances by trail, road, boat, or railroad to points of principal interest are given.

Under **Prop** (property) the size of the property and the manner in which it is held are indicated. Where the occurrences are covered by mineral claims, the number of claims, type of claims (patented or possessory title), and in many instances the names of the claims are given. Since these features of a mining property are subject to frequent change, the information under this heading cannot be expected to be entirely up to date. Although the amount of property included under one ownership may be of considerable importance, that, of course, is not necessarily a measure of the size and value of the included mineral deposit.

Under **Owner** all the known owners are listed, the present or latest owner first, the earliest owner next, and subsequent owners following in chronological order. The period of ownership or control is indicated by dates in parentheses. The address of the latest owner or lessee is usually given. The names appearing in this section may be those of actual owners or they may be of holders of possessory title, of lessees, or of purchasers on contract. In most instances no attempt was made to indicate the nature of control. Information as to ownership usually can be obtained from the County Auditor of the county in which the property is located. Information on the corporate organization of any mining company doing business in Washington may be obtained from the Corporation Division of the Secretary of State's office in Olympia, and more detailed information on the corporate history of any company which is licensed to sell stock in the state may be obtained from the Securities Division of the State License Department.

Under **Ore**, what is thought to be the most important ore metal is listed first, but for the most part little attempt is made to list the other ores in their exact relative order of importance, although the least important metals ordinarily are last. Some of the metals listed under this heading are not ores in the true sense of the word, but they are included in order to show their presence, even though they have not been recovered and sold. To restrict the metals under this heading to those strictly meeting the qualifications of ore would be impossible in view of the definition: Ore is a mineral or mineral aggregate which contains precious or useful metals and which occurs in such quantity, grade, and chemical composition as to make extraction commercially profitable. The definition thus includes economic factors, such as market prices of the metals, cost of mining, concentration, and transportation, which may change rapidly—rendering today's ore tomorrow's waste, or vice versa.

Under **Ore min** (ore minerals) are all or most of the metallic minerals which have been identified at each deposit, not necessarily in order of abundance or importance. Many of the minerals listed are accessory minerals or even impurities rather than true ore minerals.

Under **Gangue** the ore host mineral is stated, except where this information would duplicate that in the description of the deposit which follows it. Gangue has been defined as the nonmetalliferous or nonvaluable metalliferous minerals in ore, but in this report gangue has been restricted to the nonmetalliferous minerals, and

the nonvaluable metalliferous minerals are included with the ore minerals.

Under **Deposit** is a brief description of the occurrence, giving, where possible, the type of mineralization, the country rock, and size and shape of the deposit.

Under **Dev** (development) is a description of the underground workings, surface trenching, and test drill holes. Caved or flooded workings are so designated where known.

Under **Improv** (improvements) are listed those features which fall within the meaning as used in mining law—an artificial change of the physical condition of the earth upon or near a mining claim to facilitate discovery or extraction of minerals. Thus, camp buildings, roads, ore bins, mills, and the like are included under this heading.

Under **Assays** the grade of the ore is indicated by representative assays where available, and preferably by smelter returns on shipments. Assay reports, of course, are extremely subject to over-optimism, deliberate misrepresentation, careless sampling, and honest error. Owing to the none-too-reliable character of some of the source material used, the Division cannot vouch for the accuracy of the reported assays. Thus, the reader should exercise as much caution in his use of the assays reported here as he would in the use of assays from any source of unknown reliability.

Under **Prod** (production) is the date and amount of ore produced. Where the date but not the amount of production is known, only the date is given.

Under **Ref** (references) is a list of abbreviated citations to the published and unpublished reports from which the data for each property were abstracted. The reference is made by a number in bold-face type which refers to a title under the same number in the bibliography on pages 395 to 398. This is followed by the page reference or, in the case of a periodical, by a date (written 7/5/34 [July 5, 1934], or 7/34 [July 1934], or simply 1934) and then the page reference. Where the citation includes several issues of a periodical, the parts of the citation are separated by semicolons. Thus, 1, 4/18, p. 19; 7/18, pp. 45-46, refers to the Alaska and Northwest Mining Journal for April 1918, page 19, and August 1918, pages 45 to 46. References to individual titles in the bibliography are separated by periods. Certain references are omitted where a given property is listed year after year in annual directories such as the Division of Mines and Geology Directory of Washington Mining Operations or The Mines Handbook. In some instances only the latest entry is listed, and the reader may gain further information about a property by consulting earlier issues of the same annual directory.

Anyone wishing further details about a given property should refer to the specific reports cited under this heading. Most of these reports are available at public and institutional libraries. The only cited publications that are available from the Division of Mines and Geology are those, still in print, that were published by the Division or its predecessor agencies, the Washington Geological Survey, the Division of Geology, and the Division of Mines and Mining.

ABBREVIATIONS

Ag—silver	Dept.—Department	Ltd.—Limited	S—sulfur
Al—aluminum	Dev —development	max.—maximum	S.—south
approx.—approximately	dia.—diameter	Mg —magnesium	Sb—antimony
As—arsenic	dist.—district	mi.—mile, miles	Se—selenium
Au—gold	Div.—Division	min.—minimum	SE.—southeast
av.—average, averaged, averaging	E.—east	Mn—manganese	sec.—section
Ave.—avenue	Elev —elevation	Mo—molybdenum	Si—silicon
B—boron	est.—estimated	Mt.—Mount	Sn—tin
Ba—barium	et al.—et alii (and others)	Mtn., Mtns.—Mountain, Mountains	sq.—square
Be—beryllium	Ext.—Extension	N.—north	Sr—strontium
Bi—bismuth	F.—Fahrenheit	Na—sodium	SW.—southwest
Br—bromine	Fe—iron	NE.—northeast	T.—township
Bros.—Brothers	Fk.—Fork	Ni—nickel	Ta—tantalum
Bur.—Bureau	Fr.—Fraction	no.—number	Te—tellurium
C.—Centigrade	ft.—foot, feet	Nos.—Numbers	Th—thorium
Ca—calcium	Ga—gallium	NW.—northwest	Ti—titanium
Cb—columbium	Ge—germanium	O—oxygen	tr.—trace
Cd—cadmium	gm.—gram, grams	Ore min —ore mineral(s)	U—uranium
Ce—cerium	H—hydrogen	oz.—ounce, ounces	U. S.—United States
Cl—chlorine	Hg—mercury	P—phosphorus	V—vanadium
Co—cobalt	Improv —improvements	p.—page	vol.—volume
Co.—Company	in.—inch, inches	Pb—lead	W—tungsten
conc.—concentrate, concentrates	Inc.—Incorporated	%—percent	W.—west
cor.—corner	insol.—insoluble	pp.—pages	Wash.—Washington
Corp.—Corporation	Ir—iridium	Prod —production	yd.—yard, yards
Cr—chromium	Is.—Island	Prop —property	yr.—year, years
Cr.—Creek	K—potassium	Pt—platinum	Zn—zinc
Cu—copper	lb.—pound, pounds	R.—river, range	Zr—zirconium
cu.—cubic	Li—lithium	Ref —references	
	Lk., lk.—Lake, lake	Ry.—Railway	
	Loc —location		

THE METALS

GENERAL STATEMENT

The chemical elements may be divided into two groups, the metals and nonmetals. The two groups cannot be very sharply defined, and intermediate between them are a number of elements sometimes referred to as semi-metals. Some of the semi-metals, such as arsenic, antimony, and bismuth, are more commonly thought of as metals than are some of the true metals.

The metals constitute over three-fourths of the recognized elements. They possess to a greater or less degree the physical properties of ductility, malleability, opacity to light, metallic luster, and conductivity for heat and electricity. Most metals are comparatively heavy. All except mercury are solid at ordinary room temperatures, and when solid they are crystalline in structure. (On warm days cesium and gallium, which have melting points of 83.3° F. and 85.6° F. respectively, are liquid also.) Further, their chemical properties are such that they commonly play the part of the positive or basic element in a simple compound.

The nonmetals include the gases and some solids. The solid nonmetals, as contrasted with the metals, are brittle, poor conductors for heat and electricity, and are often nonopaque. Chemically, they are usually the acid or negative elements in simple compounds.

The semi-metals are less perfectly metallic in their physical properties and, chemically, they often play the part of the acidic or negative elements in their compounds.

The physical and chemical properties of the metals are manifestations of more fundamental properties in the field of crystal chemistry. These properties—the arrangement or structure, spacing, and type of bond between the atoms—have been made the basis for still other definitions for metals, but unfortunately, as one might guess from the variety of physical properties, the elements show a great diversity of crystal chemical properties also, with continuous and gradual transition from metallic to nonmetallic atomic structures. Thus, even definitions based on the most fundamental known properties of the

elements fail to sharply differentiate between metals and nonmetals.

A complicating factor is the dual role that many minerals play. For example, magnesite is an ore mineral of the metal magnesium, and as such might be classed as a metallic mineral; but on the other hand, magnesite is also used in making refractories, and for this use it would be classed as a nonmetallic mineral. Likewise, hematite and limonite, ores of iron, are also used as paint pigments; rutile, a titanium ore mineral, is used in making white pigments; chromite, the source of chromium, is also used as a refractory; and many other minerals can be classed either as metallic or nonmetallic, depending upon the particular use to which they are put. From a strictly practical point of view, the terms "metal" and "metallic mineral" as commonly used are purely conventional expressions.

Here, in Part II (Metallic Minerals) of this report, the occurrences of the following metals and semi-metals are listed: antimony, arsenic, bismuth, cadmium, cerium, chromium, cobalt, columbium, copper, gallium, germanium, gold, iron, lead, manganese, mercury, molybdenum, nickel, platinum, selenium, silver, tantalum, tellurium, thorium, tin, titanium, tungsten, uranium, vanadium, zinc, and zirconium. The occurrences of several other metals have previously been listed in Part I (Nonmetallic Minerals) of this report. These are the metals whose ore minerals can be classified either as metallic or nonmetallic. They include aluminum, barium, beryllium, boron, calcium, lithium, magnesium, potassium, silicon, sodium, and strontium.

Other minor metals probably will be found in the state as the demand for them increases. Most of the as yet undiscovered minor metals occur as accessory minerals or more often as "impurities" in other common minerals. As such they are difficult to recognize by means other than chemical or spectrographic analysis. Spectrographic analyses, especially, can be expected in the future to disclose more of the rare metals.

PHYSICAL PROPERTIES OF THE METALS

Metal	Chemical symbol	Atomic number	Atomic weight	Specific gravity	Weight per cubic foot (pounds)	Melting point (degrees C.)	Boiling point (degrees C.)
Aluminum	Al	13	26.97	2.702	168	659	2057
Antimony	Sb	51	121.76	6.68	417	630	1440
Arsenic	As	33	74.91	5.73	358	817	610
Barium	Ba	56	137.36	3.5	218	710	1500
Beryllium	Be	4	9.01	1.84	112	1284	2970
Bismuth	Bi	83	209.00	9.80	608	271	1477
Boron	B	5	10.82	2.34	144	2100	2550
Cadmium	Cd	48	112.41	8.642	540	321	767
Calcium	Ca	20	40.08	1.55	97	850	1440
Cerium	Ce	58	140.13	6.78	431	793	2417
Chromium	Cr	24	52.01	7.14	443	1550	2822
Cobalt	Co	27	58.94	8.92	555	1493	3550
Columbium	Cb	41	92.91	8.57	524	2415	3300
Copper	Cu	29	63.54	8.96	558	1083	2595
Gallium	Ga	31	69.72	5.97	369	30	1983
Germanium	Ge	32	72.60	5.32	334	958	2700
Gold	Au	79	197.2	19.3	1,206	1063	2966
Iron	Fe	26	55.85	7.87	490	1540	2735
Lead	Pb	82	207.72	11.34	708	327	1717
Lithium	Li	3	6.940	0.534	33	186	1336
Magnesium	Mg	12	24.32	1.74	109	650	1103
Manganese	Mn	25	54.93	7.44	449	1245	2097
Mercury	Hg	80	200.61	13.546	846	—39	357
Molybdenum	Mo	42	95.95	10.2	636	2622	4800
Nickel	Ni	28	58.69	8.9	555	1455	2732
Platinum	Pt	78	195.23	21.45	1,333	1773	4530
Potassium	K	19	39.096	0.86	54	62	760
Selenium	Se	34	78.96	4.81	299	217	423
Silicon	Si	14	28.09	2.32	151	1410	2480
Silver	Ag	47	107.880	10.49	655	960	2212
Sodium	Na	11	22.997	0.97	61	98	883
Strontium	Sr	38	87.63	2.6	158	770	1380
Tantalum	Ta	73	180.88	16.6	1,036	2996	5300
Tellurium	Te	52	127.61	6.24	390	452	1390
Thorium	Th	90	232.12	11.7	705	1842	4500
Tin	Sn	50	118.70	7.28	359	232	2270
Titanium	Ti	22	47.90	4.5	281	1690	3535
Tungsten	W	74	183.92	19.3	1,204	3410	5900
Uranium	U	92	238.07	19.05	1,166	1133	2071
Vanadium	V	23	50.95	6.11	272	1900	3000
Zinc	Zn	30	65.38	7.14	446	419	906
Zirconium	Zr	40	91.22	6.5	399	1830	5000

ALUMINUM

Properties—Aluminum is the third most abundant element in the earth's crust, comprising 8 percent of the crust to a depth of 10 miles, exceeded only by oxygen and silicon. It is an essential constituent of nearly all the important rocks except peridotite, sandstone, and limestone, and even in these it is a common impurity. It is easily oxidized, occurring most commonly as oxides and silicates, usually combined with other elements, and, because of its ease of oxidation, special techniques are necessary in smelting its ores. Some of the properties of aluminum are shown in the table on page 12. It is only about one-third as heavy as iron, and many of its uses derive from its light weight, combined with good malleability and resistance to corrosion, its high electrical and thermal conductivity, silvery luster, and high power of reflecting light and heat.

Uses—The largest user of the metal and its alloys is the building trade—for roofing, siding, window frames, ventilating ducts, and many other applications. Other large users are in the field of transportation—for trucks, busses, railroad cars, and of course for airplanes, the latter use being especially great during wartime expansion of the Air Force. Aluminum and its alloys are used in cooking utensils, household appliances, electrical wire and cable, machinery, furniture, tools, instruments, foil, and chemicals.

Production—Production involves reduction of bauxite to alumina (Al_2O_3) by the Bayer process, followed by treatment of the alumina by the Hall process, which produces metallic aluminum by electrolysis in a bath of molten cryolite. The largest production cost is for electricity. Because of the availability here of cheap electrical power a sizable portion of the United States production of aluminum comes from Washington, but as yet none has come from Washington ores. However, exploration of ferruginous bauxite in the southwestern part of the state by the Aluminum Company of America, and of high-alumina clays at several places in the state by Federal agencies has revealed substantial tonnages of these potential ores of aluminum, and it is reasonable to assume that some of them will be used in the not-too-distant future.

OCCURRENCES

Occurrences of the minerals which might under certain conditions be classed as ores of aluminum are described in the previously published Part I (Nonmetallic

In 1955 there were five aluminum reduction plants in Washington, one each at Longview, Spokane, Tacoma, Vancouver, and Wenatchee. The 1953 production from these plants was nearly 50 percent greater than that of the previous year, and in 1954 output increased 8 percent to approximately 430,000 short tons of metal having a value of about \$175 million.

Prices—The price history of aluminum is interesting. In 1856 the price was about \$90 a pound; at the time of Hall's discovery in 1886 it was about \$5; between 1897 and 1924 the price fluctuated violently several times between peaks as high as 61 cents and lows as little as 19 cents; the 1924 price of 25 cents declined steadily to 15 cents by 1941, at which it remained until 1947, when it began a slow rise to 23.2 cents by January 1955. During the past few decades, when aluminum has been produced in important commercial quantities, its market price has been remarkably stable, the fluctuations being relatively small and gradual.

Ore minerals and geology—The principal ore of aluminum is bauxite, which is a mixture of hydrous aluminum oxides ranging from gibbsite, $Al_2O_3 \cdot 3H_2O$ to boehmite and diaspore, both $Al_2O_3 \cdot H_2O$, with corresponding ranges of 65 to 85 percent Al_2O_3 . Bauxite belongs to a group of residual materials called laterite, and is produced from aluminum-bearing rocks such as syenite, granite, diorite, basalt, shale, and clay by weathering processes in which hydrated aluminum oxides are concentrated by removal of other constituents. All bauxite contains impurities, including silica, titania, and iron oxides. During World War II plants were built for the production of alumina from high-alumina clays, containing 35 percent or more Al_2O_3 ; from alunite, $K_2Al_6(OH)_{12}(SO_4)_4$, containing 37 percent Al_2O_3 ; and from anorthosite, a rock composed largely of feldspar, labradorite or anorthite, the latter having the formula, $CaAl_2Si_2O_8$ and containing 36.7 percent Al_2O_3 . Some of these plants produced briefly on an experimental basis, but they were unable to compete successfully with plants using bauxite as ore. None of these materials other than bauxite are usable under present conditions as an ore of aluminum.

Minerals) of this report—ferruginous bauxite, high-alumina (refractory) clays, alunite, and feldspar.

ANTIMONY

Properties—Antimony is chemically similar to arsenic and bismuth. The metal is silver white, exceedingly brittle, and has a hardness (Moh's scale) of 3.0 to 3.5. It is a poor conductor of heat and electricity. Other properties are given in the table on page 12. Those properties which have important influence on its uses are: expansion on solidifying from a melt, strong diamagnetism (property of repelling a magnetic field), and marked thermoelectric properties. It crystallizes in the rhombohedral division of the hexagonal system. Antimony commonly shows two valences, 3 and 5. With a valence of

5 it acts as a nonmetal, but in the valence of 3 it plays the part of either a nonmetal or a metal. Thus it falls in the class of semi-metals. It is not acted upon by air at room temperatures, but when heated it burns to form white fumes of the oxide Sb_2O_3 .

Uses—About half of the antimony used is in the form of antimonial lead, in which the antimony content varies from about 2 to 25 percent, depending upon the use. Listed in decreasing order of importance from the point of view of tonnage, antimonial lead is used as bearing metal, storage battery plates, type metal, sheet and pipe

for the chemical and building industries, castings, cable covering, collapsible tubes and foil, and ammunition. In wartime the last mentioned use assumes greater importance, of course. Substitutes for antimony have been developed for many of these uses, but not in the manufacture of type metal. In this application its value lies in hardening the type and especially in the unusual property of expanding when it cools. Antimony has some uses as alloys with other metals—tin, copper, zinc, and aluminum being most common. Chemical compounds of antimony are used in greatest quantities in ceramics but are also important as ingredients of paints and lacquers, in flameproofing textiles, in coloring glass, in manufacturing cellulose acetate, and in miscellaneous uses such as vulcanizing rubber, colorfast dyes, and medicinal products.

Production—Antimony was first discovered in Washington probably in 1892 at the Great Republic mine in King County. A little ore was mined there between 1900 and 1905. Other small, sporadic production has been reported from Okanogan and Stevens Counties: an estimated 2,300 tons during World War I; small amounts in 1936, 1937, and 1939; 2 carloads in 1941; 205 tons in 1946; 335 tons in 1947; 48 tons in 1949; an estimated 150 tons in 1951; and an estimated 35 tons were mined and stockpiled in 1952.

Prices—The price of antimony has been very erratic, at times showing wide variations from month to month as well as from year to year. For example, the price of 10 cents per pound in 1915 jumped to 44 cents early in 1916. Later in the same year it dropped to 11 cents, only to rise to 33 cents early in 1917 and then drop back to 14 cents later that year. There were similar fluctuations during the period 1924 to 1927, and in 1952 the price ranged between an all-time high of 53 cents and a low of 38 cents. Four times during the period 1905 to 1935 the price was as low as 8 cents, with intervening highs of 16 cents or more. This chaotic price history has been a large factor in retarding the development of antimony properties in this country.

Ore minerals—The principal ore of antimony is the sulfide, stibnite, Sb_2S_3 , containing 71.4 percent antimony, but most of the normal domestic supply is recovered as

a byproduct from smelting copper, silver, and lead ores, in which it occurs most commonly as tetrahedrite, $Cu_{12}Sb_4S_{13}$, containing about 25 percent antimony. Native antimony occurs elsewhere, but it is not known in Washington. Three of the four known antimony oxides, valentinite, Sb_2O_3 , cervantite, $Sb_3O_6(OH)$, and stibiconite, $Sb_3O_6(OH)$, are found in this state in small quantities, and in some countries these oxides are important ore minerals. Occurrences have been reported in Washington of the following minerals in which antimony is combined with one or more of the elements, lead, silver, copper, arsenic, iron, and sulfur: kermesite, Sb_2S_2O ; pyrargyrite, Ag_3SbS_3 , containing 59.7 percent silver, 22.5 percent antimony; boulangerite, $Pb_5Sb_4S_{11}$; stephanite, Ag_5SbS_4 ; jamesonite, $Pb_4FeSb_6S_{14}$; bournonite, $PbCuSbS_3$; geocronite, $Pb_5(Sb,As)_2S_8$; berthierite, $FeSb_2S_4$; bindheimite, $Pb_3Sb_2O_7 \cdot nH_2O$; dyscrasite, Ag_3Sb ; zinkenite, $Pb_6Sb_{14}S_{27}$; andorite, $PbAgSb_3S_6$; meneghinite, $Pb_{13}Sb_7S_{23}$; and diaphorite, $Pb_2Ag_3Sb_3S_8$.

Geology—The antimony-bearing minerals can form under a wide range of conditions and they occur associated with a great variety of minerals, but stibnite, the only important ore of antimony, is found typically in epithermal deposits. As described by Purdy:^①

Stibnite in Washington shows no particular affinity to any individual rock type. Commonly, stibnite occurs, (1) as all or part of the cementing material in breccias, (2) as irregular masses erratically distributed in quartz veins, or as disseminated particles or clusters throughout quartz veins, (3) as replacement deposits associated with fractured and/or silicified areas in limestone, and (4) as small lenticular bodies, veins, veinlets, and disseminated particles throughout hydrothermally altered zones, or it is erratically distributed along shears in those zones. In all of these instances the stibnite proves to be the last sulfide mineral to have formed, which attests to the very low temperature and pressure conditions that seem to be most favorable for its development. As is characteristic of the epithermal group, the stibnite deposits are erratic and unreliable in the extreme, the majority of them the world around only reaching to comparatively shallow depths, possibly not over 2,000 feet, and containing ore of extremely irregular grade along the strike and dip. Most deposits, probably because of erosion since they were formed, seem to die out within a few hundred feet of the surface.

^① Purdy, C. P., Jr., Antimony occurrences of Washington: Washington Div. Mines and Geol. Bull. 39, pp. 53-54, 1951.

OCCURRENCES

The map showing the numbered antimony occurrences is plate 1, on page 7 in volume 2.

CHELAN COUNTY

Bald Eagle and Gray Eagle
(see under copper)

Blewett
(see Peshastin under gold)

Caledonia (10)
(see under gold)

Ellen
(see Van Epps)

Gray Eagle
(see Bald Eagle and Gray Eagle under copper)

Humbug
(see under lead)

Hunter (4)
(see under silver)

Keefer Brothers (6)
(see under molybdenum)

King Solomon
(see Van Epps)

La Rica
(see Peshastin under gold)

Little Jap (2)
(see under silver)

Marcus Stein (1)
(see under silver)

Orphan Boy (5)
(see under silver)

Peshastin (9)
(see under gold)

Sevenmile Creek (1A)

Loc: SE¼ sec. 15, (31-17E), on Sevenmile Cr. **Elev:** 3,200 ft. **Access:** Road from Lucerne and ½ mi. of trail. **Owner:** Oscar Getty, Lucerne, Wash. (1952—). **Ore:** Antimony. **Ore min:** Stibnite, pyrite, nickel. **Deposit:** 2 veins, one 2 to 5 ft. thick and traceable for 50 ft., the other 10 to 12 ft. thick. Both are silicified breccia zones in granodiorite. They contain pyrite, a very little stibnite, and some green nickel stain. **Dev:** 100-ft. adit on lower (wider) vein. **Ref:** 158.

Silver Fiend (8)
(see under lead)

Snook and Ellen
(see Van Epps)

Sunday Morning (3)
(see under silver)

Van Epps (Snook and Ellen, King Solomon) (7)

Loc: SW¼ sec. 4, (23-15E), at head of Solomon Cr. on W. end of Solomon Mtn. **Elev:** 6,000 ft. **Access:** 12 mi. up Jack Cr. and 3 mi. up Solomon Cr. by trail. **Prop:** 15 unpatented claims. **Owner:** B. F. Harrison, Seattle, Wash. (1949). **Ore:** Antimony, gold, silver, lead, zinc, nickel. **Ore min:** Arsenopyrite, millerite, chalcopyrite, galena, stibnite, berthierite, sphalerite. **Gangue:** Quartz, carbonate minerals. **Deposit:** Mineralized contact zone 10 to 20 ft. wide along contact of diorite and serpentine has been traced for 220 ft. **Dev:** 210-ft. adit, 28-ft. adit, 10-ft. crosscut, open cut. **Assays:** Sample taken across zone at Snook adit assayed 0.22 oz. Au, 0.58 oz. Ag. Assay at Ellen adit gave 0.04 oz. Au, nil Ag. **Ref:** 63, p. 62. 67, p. 29. 130, p. 59. 132, pp. 62-66.

Wenatchee

Loc: Wenatchee dist. **Ore:** Antimony. **Deposit:** Ore from the Antimony Queen mine in Okanogan County was shipped to Pateros and thence to Wenatchee during 1916. Probably this fact is responsible for reported antimony production in the Wenatchee area. **Prod:** Small production reported in 1916. **Ref:** 67, p. 46.

White Star
(see under lead)

CLALLAM COUNTY

Bright Angel (1)
(see under manganese)

FERRY COUNTY

Advance (15)
(see under silver)

Black Hawk (6)
(see under lead)

Colorado (7)
(see under lead)

Comstock (1)
(see under copper)

Gwin (4)
(see under silver)

Hall Creek
(see Gwin under silver)

Juliet (9)
(see under lead)

Keystone (14)
(see under silver)

Kohler (3)
(see under copper)

La Fleur
(see Comstock under copper)

Little Tom
(see Juliet under lead)

Longstreet (16)
(see under silver)

Meteor (12)
(see under silver)

Montana (10)
(see under silver)

New York (13)
(see under lead)

Old Nell (17)
Loc: Near center S½ sec. 36, (32-36E), ¾ mi. NE. of Covada post office. **Prop:** 1 claim. **Ore:** Antimony, silver, gold. **Ore min:** Native antimony. **Deposit:** Quartz veinlets in granodiorite and quartzite. **Dev:** 7-ft. shaft; open cut 8 ft. long, 4 ft. deep; 25-ft. adit. **Assays:** Sample from open cut near center of the claim showed tr. Au, 0.20 oz. Ag. **Ref:** 122, p. 169. 163, p. 54.

Perry (18)
Loc: Near center NE¼ sec. 36, (32-36E), 1 mi. NE. of Covada post office. **Prop:** 1 claim. **Owner:** Joseph Hartwell (1912). **Ore:** Antimony. **Deposit:** 4-ft. quartz vein in quartzite carries antimony, well mineralized and resembling the Longstreet vein. **Dev:** 42-ft. slope, two 10-ft. adits, several open cuts. **Assays:** Vein is rich in antimony. **Ref:** 122, p. 169. 163, p. 80.

Pin Money (2)
(see under gold)

Polepick (22)
(see under copper)

Robert E. Lee (19)
Loc: Near center NE¼ sec. 36, (32-36E), Covada dist. **Elev:** 2,160 ft. **Access:** 5 mi. S. of Inchelium by road. **Prop:** 2 unpatented claims. **Owner:** H. B. Rosenbaum, Inchelium, Wash. (1949). **Ore:** Antimony, silver, gold. **Ore min:** Stibnite, pyrite, arsenopyrite, sphalerite, chalcopyrite, tetrahedrite, galena. **Gangue:** Altered granodiorite. **Deposit:** Silicified and altered granodiorite bordering an alaskite dike. Zone on one side is 10 to 15 ft. wide and on the other side, 60 to 70 ft. wide. **Dev:** 76-ft. crosscut in which is a 5-ft. winze, also a glory hole 40 by 100 by 50 ft. deep. **Assays:** One sample showed 57.35% Sb. Assay of a picked sample showed tr. Au, Ag. **Ref:** 7, p. 196. 105, 1908, p. 686. 122, pp. 168-169. 129, p. 58. 132, pp. 68-71. 141, p. 50. 163, pp. 66-67.

Rosario (11)
(see under copper)

Silver Crown No. 1 (21)
Loc: NW¼ sec. 6, (31-37E), just E. of Silver Crown No. 2. Covada dist. **Prop:** 1 claim. **Owner:** Mr. Howe (1912). **Ore:** Antimony. **Ore min:** Pyrite, stibnite (?). **Deposit:** Several quartz veins 4 to 16 in. wide in quartzite. One 16 in. wide consists of solid quartz with some pyrite and antimony. **Dev:** 12-ft. shaft, 125-ft. adit, several open cuts. **Ref:** 163, pp. 58-59.

Silver Leaf (5)
(see under silver)

Stray Dog (8)
(see under silver)

Summit (20)
(see under lead)

KING COUNTY

Aces Up (13)
(see under silver)

Bear Basin (9)
(see under silver)

Cleopatra (10)
(see under silver)

Coney Basin (7)
(see under copper)

Dawson (11)
Loc: NW¼ sec. 24, (25-10E), near head of Bear Cr. **Elev:** 5,350 ft. **Access:** Trail from Cleopatra Basin. **Prop:** Part of 25 claims in the Bear Basin group. **Owner:** Bear Basin Mining Co., Bremerton, Wash. (1949). **Ore:** Antimony. **Ore min:** Pyrite, stibnite, stibiconite. **Gangue:** Altered granodiorite, rhodochrosite. **Deposit:** Altered zone in granodiorite 11 ft. wide is mineralized for 1½ ft. along the hanging wall. Mostly pyrite but some stibnite as radiating clusters of crystals ½ in. in diameter. **Dev:** 2 open cuts. **Ref:** 132, pp. 83-84.

Dutch Miller (15)
(see under copper)

Gold Mountain (2)
(see under silver)

Grand Central (14)
Loc: Sec. 29, (25-11E), S. of Money Cr. **Access:** 1 mi. from railroad at Berlin. **Owner:** Gold Mountain Mining Co. (1915). **Ore:** Antimony, gold. **Ore min:** Stibnite (in upper adit), pyrite. **Gangue:** Quartz, calcite. **Deposit:** Narrow veinlets of quartz, calcite, and pyrite in a 40-ft.-wide zone in Keechelus andesite. **Dev:** An upper adit and a 1,200-ft. lower adit. **Assays:** Av. \$4.00 per ton (probably in gold). **Prod:** 1908. **Ref:** 97, 1908, p. 578. 116, no. 7, 1907, p. 13. 147, pp. 171, 185.

Great Republic (Happy Thought) (4)
Loc: N½SW¼ sec. 33, (26-11E), at first falls on Happy Thought Cr. **Elev:** 1,200 ft. **Access:** 1½ mi. up Miller R. road, thence by trail. **Prop:** 5 unpatented claims. **Owner:** Charles Wible, Tacoma, Wash. (1949). Great Republic Gold Mining Co. (1902-1905). **Ore:** Antimony, gold, silver. **Ore min:** Stibnite, pyrite. **Gangue:** Quartz, calcite. **Deposit:** Flat-lying mineralized fault in andesite. At one place a lens of stibnite 2½ ft. wide is exposed for a distance of 4 ft. **Dev:** 2 adits connected by a raise total 1,100 ft. of workings. **Assays:** One assay showed 14.05% Sb, 0.03 oz. Au, 2.41 oz. Ag. 6 samples taken to show mineral distribution, not av. grade of ore, showed 0.06% to 21.62% Sb, nil to 0.50 oz. Ag from widths of 0.2 to 4.0 ft. **Prod:** 1938-1941. **Ref:** 88, p. 84. 130, p. 59. 132, pp. 75-78. 141, p. 50. 157. 159, p. 135.

Happy Thought
(see Great Republic)

Kimball (3)
(see under gold)

Last Chance (6)
(see under gold)

Lennox (8)
(see under gold)

Mohawk (5)
Loc: Sec. 9, (25-11E), Miller R. dist., N. of Seattle Cascade property. **Ore:** Antimony. **Ref:** 114, no. 5, 1909, p. 112.

Pedro
(see under copper)

Salmon Creek (1)
Loc: S½ sec. 10, (26-10E), 1 mi. S. of Baring. **Prop:** 5 unpatented claims. **Owner:** W. R. Anderson, Baring, Wash. (1936). **Ore:** Reportedly antimony. **Ref:** 158.

Silver Star (12)
(see under silver)

Sockless Jerry
(see Last Chance under gold)

KITTITAS COUNTY

Denny
(see Goat Mountain)

Goat Mountain (Denny) (1)
Loc: NE¼ sec. 10, (23-14E), at base of Goat Mtn. about 300 ft. above Cle Elum R. **Elev:** 3,700 ft. **Access:** 1½ mi. above Fortune Cr. on Cle Elum R. road, thence across the river and up a small creek. **Owner:** Fred Denny, Seattle, Wash. **Ore:** Antimony. **Ore min:** Stibnite, pyrite, magnetite, chromite, nickeliferous carbonate. **Gangue:** Quartz, calcite, sericite. **Deposit:** Breccia along the fault contact of Swauk sediments with serpentine contains a 6-in. quartz vein mineralized with stibnite. **Dev:** 178-ft. adit, 3 open cuts. **Assays:** 2 representative samples showed 0.15% and 1.75% Sb. **Ref:** 111, p. 1. 132, pp. 87-90. 146, p. 14.

Grizzly Bear
(see under gold)

Majestic
(see under gold)

Ruby King
(see under gold)

LEWIS COUNTY

Jug Lake (2)
Loc: Reportedly on the W. shore of Jug Lk. **Access:** Trail up Summit Cr. or up Deep Cr. from Copper City. **Ore:** Antimony. **Ore min:** Stibnite. **Deposit:** Said to be a 2-ft. vein of antimony sulfide exposed in the lake shore and extending into the lake. **Note:** One investigator was unable to find this prospect. **Ref:** 158.

Reeves (1)
Loc: Center NE¼ sec. 29, (15-11E), ¼ mi. NW. of Frying Pan Lk. **Elev:** 5,300 ft. **Access:** 7 mi. by trail from Ohanapecosh Hot Springs. **Prop:** 1 claim: High Jack No. 2. **Owner:** Abandoned (1949). W. R. Reeves, Universal Alaska Mining Corp. (1933). **Ore:** Antimony. **Ore min:** Stibnite, stibiconite. **Gangue:** Quartz. **Deposit:** A hydrothermally altered zone in serpentine 10 ft. wide contains a 6- to 8-in. band of stibnite-bearing siliceous breccia. **Dev:** Trench and caved adit (1947). **Ref:** 132, p. 91.

OKANOGAN COUNTY

Andy O.
(see Andy O'Neil under silver)

Andy O'Neil (44)

(see under silver)

Antimony

Loc: NW¼ sec. 30, (38-27E). **Ore:** Antimony. **Ore min:** Stibnite. **Deposit:** Country rock is slate and quartzite. No vein observed, but short irregular drifts in the adit probably represent places where the ore was removed. **Dev:** 200-ft. adit. **Ref:** 154, p. 107.

Antimony Bell (Antimony Belle) (37)

Loc: NE¼SE¼ sec. 25, (31-21E), on hill SE. of the S. Fk. of Gold Cr. **Elev:** 2,300 ft. **Access:** 3 mi. by road up the S. Fk. of Gold Cr., thence a few hundred yards by trail. **Prop:** 1 claim: Antimony Bell. **Owner:** Charles Williams, Carlton, Wash. (1949). **Ore:** Antimony. **Ore min:** Stibnite, stibiconite. **Gangue:** Calcite, breccia. **Deposit:** Stibnite occurs along a shear zone in greenstone. The shear zone is 3 to 10 in. wide and has been exposed at intervals for 200 ft. **Dev:** 32-ft. shaft, 25-ft. adit, 20-ft. adit, 25-ft. adit in which is a 20-ft. drift, open cut. **Prod:** 1,300 lb. of stibnite shipped in 1940. **Ref:** 132, pp. 107-109.

Antimony Queen (New Deal, Dixie Queen, Reedy, Silver Seal) (34)

(see also Jumbo)

Loc: SW¼NW¼ sec. 11, (31-21E). **Elev:** 2,050 to 2,550 ft. **Access:** 4.3 mi. up Gold Cr. road from Methow highway. 21 mi. to railroad at Pateros. **Prop:** 4 unpatented claims: Jumbo, Silver Seal Nos. 1 to 3. **Owner:** H. B. Johnston, Seattle, Wash. leasing to G. O. P. Antimony, Inc. (1951-1952). Antimony Queen Mining Co. (1907-1908). H. B. Johnston, Vernon La-Motte, George Gibson (1940). William Oldfield (1941). **Ore:** Antimony, gold, silver, tungsten. **Ore min:** Stibnite, pyrite, scheelite, pyrrhotite, galena, jamesonite, sphalerite, arsenopyrite, chalcopyrite. **Gangue:** Calcite. **Deposit:** Quartz veins and mineralized breccia zones in limy argillite. One vein is 2 to 12 in. wide and carries from 10% to 90% stibnite. Ore shoots up to 2 ft. wide and 40 ft. long. **Dev:** 3 main adits, a caved shorter adit, and several open cuts. Total length of workings about 1,000 ft. **Assays:** A 4-ft. sample from the face on the No. 5 level assayed 0.10 oz. Au, 3.6% Sb, 2.4% As. Another sample showed 0.46 oz. Ag. **Prod:** 1,050 tons of ore from 1907 to 1941. 20 tons produced in 1941 assayed 27% Sb. 1951. **Ref:** 37, pp. 50-51. 43, 1918, p. 309. 97, 1918, p. 42. 105, 1907, pp. 41, 264. 108, 4/41, p. 12. 130, p. 58. 132, pp. 109-122. 133, p. 33. 141, p. 51. 157. 158.

Apache (48)

(see under silver)

Arizona

(see under silver)

Arlington (28)

(see under silver)

Bales (31)

Loc: SW¼NE¼ sec. 17, (32-22E), 2 mi. NE. of Carlton. **Elev:** 3,200 ft. **Access:** Bulldozer trail. **Prop:** 1 unpatented claim: Bales. **Owner:** Ollie Scott and D. R. Smith (1949—) leasing to Ernest Oberbillig (1951-1952). **Ore:** Antimony. **Ore min:** Stibnite, stibiconite. **Deposit:** Altered and silicified zones up to 7 ft. wide in diorite, greenstone, and argillite contain veins of massive stibnite as much as 2 ft. wide. Stibnite av. 4 in. wide over an exposed length of 240 ft. **Dev:** Surface trenching, 75-ft. crosscut with 120-ft. drift and stope, 110-ft. adit. **Assays:** An assay of vein matter at the discovery post yielded 10.9% Sb. Arsenic av. about 0.2%. **Prod:** 1951-1952 (100 tons ore est). **Ref:** 132, pp. 122-123. 133, p. 33. 158.

Bellevue (6)

(see under gold)

Billy Goat (1)

(see under copper)

Buckeye

(see under silver)

Buckeye (8)

(see under copper)

Bunker Hill

(see Silver King under lead)

Carlquist (10)

Loc: SE¼NW¼ sec. 30, (40-29E), ½ mi. E. of Mud Lk., 10 mi. E. of Oroville. **Elev:** 4,000 ft. **Prop:** Deeded land. **Owner:** John Widell (1947). **Ore:** Antimony. **Ore min:** Boulangerite, arsenopyrite. **Deposit:** A 4-in. quartz vein along a fault in quartzite carries scattered ore minerals. **Dev:** Pit 5 ft. square and 4 ft. deep. **Ref:** 132, p. 92.

Castle Creek (39)

(see under lead)

Chief Sunshine (18)

(see under silver)

Chloride

(see under silver)

Coyote (33)

Loc: Center sec. 14, (31-21E), on ridge at junction of the Middle Fk. with Gold Cr. **Elev:** 2,800 ft. **Access:** ½ mi. up the Middle Fk. road, thence by trail for ¼ mi. **Prop:** 1 claim: Coyote. **Owner:** Abandoned (1948). **Ore:** Antimony. **Ore min:** Stibnite, pyrite. **Gangue:** Quartz. **Deposit:** Mineralization along a narrow brecciated zone in argillite. **Ref:** 132, pp. 123-124.

Crystalite

(see under gold)

Dixie Queen

(see Antimony Queen)

Double Header

(see Little Chief under silver)

First Thought (23)

(see under silver)

Fourth of July (29)

(see under silver)

Frankie Boy (21)

(see under silver)

Grand Coulee

(see Little Chief under silver)

Hardscrabble (13)

(see under silver)

Hargrove

(see Silver King under lead)

Healum (36)

Loc: Several hundred yd. S. of Gold Cr., on a small tributary which is about 2 mi. W. of mouth of Gold Cr. **Owner:** Mr. Healum, Methow, Wash. (1940). **Ore:** Antimony. **Deposit:** Small deposit. **Ref:** 158.

Hercules (42)

(see under lead)

- Horn Silver (4)**
(see under silver)
- Ivanhoe (7)**
(see under silver)
- Jumbo (35)**
(see also Antimony Queen)
Loc: SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 11, (31-21E), on S. side of Gold Cr.
Elev: 3,000 ft. **Access:** 4 mi. up Gold Cr. from State Highway No. 16 by road. **Prop:** 1 claim in the Antimony Queen group.
Owner: H. B. Johnston, Seattle, Wash. (1949). **Ore:** Antimony.
Ore min: Stibnite, pyrite. **Gangue:** Quartz. **Deposit:** Mineralized shear zone 1 to 2 ft. wide in argillite and conglomerate. About 20 tons of ore on the dump. **Dev:** Trench 20 ft. long.
Ref: 132, pp. 124-125.
- Laeuna**
(see Leuena under silver)
- Last Chance (24)**
(see under silver)
- Launa**
(see Leuena under silver)
- Lawrence**
(see Lucky Knock)
- Leonora (25)**
(see under lead)
- Leuena (19)**
(see under silver)
- Lilman (45)**
(see under silver)
- Little Chief (46)**
(see under silver)
- Lone Star (20)**
(see under lead)
- Lucky Knock (Lawrence) (9)**
Loc: SW $\frac{1}{4}$ sec. 19, (38-27E), W. of Whitestone Mtn. **Elev:** 1,550 ft. **Access:** 5 mi. by road from railroad at Tonasket.
Prop: 6 patented claims: Lucky Knock, White Rock, Frozen Mitt, Dead Horse, Sky Line, Perhaps. **Owner:** E. A. Magill, Seattle, Wash. (1950—). Lucky Knock Mining Co. (1907-1918). Standard Sanitary Manufacturing Co. (1915-1934). Whitestone Mines, Inc. (1941-1950). **Ore:** Antimony. **Ore min:** Stibnite, few grains of sphalerite. **Gangue:** Calcite, quartz. **Deposit:** Irregular "pockets" of stibnite intermittently replacing limestone. **Dev:** 1,000 ft. of drifts, crosscuts, and winzes. **Assays:** 47.83 tons shipped in 1949 av. 55.9% Sb. **Prod:** 1907, 1908, 1915-1917, 1941. 600 tons prior to 1949. 47.83 tons in 1949. 1951. **Ref:** 97, 1907, p. 709; 1918, p. 42. 112, p. 190. 121, vol. 7, 8/22, pp. 94-96. 130, p. 58. 132, pp. 92-104. 133, p. 33. 141, pp. 50-51. 154, p. 107. 158.
- Mineral Hill (14)**
(see under silver)
- Minnehaha (15)**
(see under silver)
- Mountain Boy (40)**
(see under lead)
- Nevada (26)**
(see under silver)
- New Deal**
(see Antimony Queen)
- Olentangy (11)**
(see under gold)
- Panama (49)**
(see under silver)
- Par Value (47)**
(see under silver)
- Peacock (22)**
(see under silver)
- Plant-Callahan (30)**
(see under silver)
- Prince**
Loc: Riverside area. **Owner:** Montana-Washington Engineering Co. **Ore:** Antimony. **Ref:** 158.
- Pyrargyrite**
(see Ruby under silver)
- Ramore (43)**
(see under lead)
- Reedy**
(see Antimony Queen)
- Rich Bar (5)**
(see under copper)
- Ruby (3)**
(see under silver)
- Salmon River (16)**
(see under silver)
- Seven Devils**
(see Mineral Hill under silver)
- Sidewinder**
(see under gold)
- Silver King (17)**
(see under lead)
- Silver Seal**
(see Antimony Queen)
- Sonny Boy (27)**
(see under silver)
- Stibnite (32)**
Loc: NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, (31-21E), on ridge N. of the old Foggy Dew C.C.C. camp. **Elev:** 2,800 ft. **Access:** Road to the Foggy Dew camp, thence across country on foot. **Owner:** Abandoned (1948). **Ore:** Antimony. **Ore min:** Stibnite. **Deposit:** Shear zone 2 ft. wide in diorite may have been mineralized to a width of 1 ft. by stibnite. No ore in sight. **Dev:** 10-ft. trench.
Ref: 132, pp. 125-126.
- Summit (38)**
(see under lead)
- Sunrise**
(see under silver)
- Sunshine Chief**
(see Chief Sunshine under silver)
- Swayne (2)**
(see under copper)
- Wasco (41)**
(see under silver)
- Washington Consolidated**
(see Mineral Hill under silver)
- Whitestone (12)**
(see under gold)

Windfall

(see under silver)

PEND OREILLE COUNTY

Bromide

(see La Sota under silver)

La Sota (3)

(see under silver)

Lena Belle (5)

Loc: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, (32-45E), near foot of SW. slope of No Name Peak, Newport dist. **Elev:** 3,000 ft. **Access:** Road. **Owner:** C. W. Carter and W. M. Miles, Newport, Wash. (1950). **Ore:** Antimony. **Ore min:** Stibnite. **Deposit:** A deposit of massive stibnite 18 in. thick was exposed for a strike length of about 10 ft. in dolomite. **Ref:** 132, p. 126. 139.

Maryland

(see Pinnel)

Oriole (2)

(see under zinc)

Pinnel (Maryland) (4)

Loc: NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, (33-44E), on E. bank of N. Fk. of Skookum Cr. **Elev:** 3,200 ft. **Access:** 8 $\frac{1}{2}$ mi. from Usk on the Skookum Cr. road. **Prop:** 60 acres deeded land. **Owner:** Ed Maryland, Usk, Wash. (1949). Leased by J. W. Pinnel (1942). **Ore:** Antimony. **Ore min:** Stibnite. **Deposit:** Lenses of intermixed quartz and stibnite, $\frac{1}{8}$ in. wide and 4 in. in dia. fill fractures in quartzite a few hundred ft. W. of granodiorite body. **Dev:** 480-ft. adit, two open cuts. **Ref:** 29, pp. 70-71. 132, pp. 126-127. 139, pp. 52-53. 157.

Silver Crest

(see La Sota under silver)

Uncas (1)

(see under zinc)

SKAGIT COUNTY

Higgins Mountain

(see Lawrence under copper)

Lawrence (1)

(see under copper)

SNOHOMISH COUNTY

Alleghany

(see Foggy under copper)

Big Four (10)

(see under lead)

Bonanza Queen (7)

(see under copper)

Clara Thompson

(see Jasperson under gold)

Columbia Mountain

Loc: Troublesome Cr. area, 15 mi. from Index. **Access:** Trail. **Prop:** 2 claims. **Ore:** Reportedly antimony. **Ore min:** Said to be tetrahedrite. **Ref:** 158.

Commonwealth

(see Jasperson under gold)

Consolidated

(see under gold)

Eureka (8)

(see under copper)

Everett (9)

(see under copper)

Feldt (1)

(see under silver)

Foggy (14)

(see under copper)

"45" (11)

(see under silver)

Glengarry

(see under silver)

Gold Mountain (3)

(see under copper)

Gray Mare (2)

(see under silver)

Hard Pass (12)

(see under copper)

Jasperson (13)

(see under gold)

McCombs

(see Jasperson under gold)

Magus

(see "45" under silver)

Monitor and Sterling (6)

(see under copper)

Monte Cristo (16)

(see under gold)

Myrtle C (4)

(see under copper)

Mystery

(see Monte Cristo under gold)

New Seattle (5)

(see under silver)

Old Gray Mare

(see Gray Mare under silver)

Penn

(see Foggy under copper)

Perm

(see under gold)

Pride

(see Monte Cristo under gold)

Sterling

(see Monitor and Sterling under copper)

Webster

(see Jasperson under gold)

Whistler (15)

(see under lead)

STEVENS COUNTY

Acme (25)

(see under lead)

Aguila (26)

(see under lead)

Anaconda (8)

(see under lead)

Ark (24)

(see under silver)

- Banner**
(see Chinto under copper)
- Blue Star**
(see Eagle under silver)
- Boundary Silver Lead**
(see Lucile under zinc)
- Brooks (47)**
(see under silver)
- Chewelah Eagle**
(see Eagle under silver)
- Chinto (30)**
(see under copper)
- Cleveland (42)**
(see under lead)
- Columbia River (20)**
(see under copper)
- Contention**
(see Mountain View under silver)
- Copper King (7)**
(see under lead)
- Copper Queen (28)**
(see under copper)
- Daisy**
(see Daisy-Tempest under silver)
- Daisy-Tempest (27)**
(see under silver)
- Deer Trail (43)**
(see under silver)
- Delmonico**
(see Jay Dee under silver)
- Dora**
(see Acme under lead)
- Eagle (32)**
(see under silver)
- Eagle-Newport**
(see Aguila under lead)
- Easter Sunday (1)**
(see under gold)
- Edna (39)**
(see under copper)
- Enterprise**
(see Jay Dee under silver)
- Frisco Standard (12)**
(see under silver)
- Galena Farm (17)**
(see under lead)
- Gold Bar (19)**
(see under gold)
- Hartford**
(see Krug under copper)
- High Grade**
(see Jay Dee under silver)
- Hoodoo (44)**
(see under silver)
- Jay Dee (29)**
(see under silver)
- Jay Gould (33)**
(see under silver)
- Joe Day (16)**
Loc: Sec. 25, (38-39E). **Access:** Near road. **Prop:** Said to consist of several unpatented claims. **Owner:** Joe Day, Colville, Wash. (1941). **Ore:** Antimony. **Ore min:** Stibnite. **Ref:** 30, p. 86.
- Kazian**
Loc: Stevens County. **Owner:** John Kazian, Seattle, Wash. (1945). **Ore:** Antimony. **Ore min:** Stibnite. **Gangue:** Quartz, calcite. **Ref:** 158.
- Kemp Komar**
(see Loon Lake Copper under copper)
- Keough (13)**
(see under lead)
- Key West**
(see Loon Lake Copper under copper)
- King**
(see Edna under copper)
- Krug (36)**
(see under copper)
- Liberty Copper (37)**
(see under copper)
- Little Frank (45)**
(see under lead)
- Longshot (22)**
(see under lead)
- Loon Lake Copper (40)**
(see under copper)
- Lucile (9)**
(see under zinc)
- Maple Leaf**
(see Melrose under silver)
- Melrose (6)**
(see under silver)
- Middleport (23)**
(see under zinc)
- Mountain View (4)**
(see under lead)
- Mullen (34)**
(see under lead)
- Myeerah (10)**
(see under lead)
- Nevada (38)**
(see under lead)
- Newland**
(see Longshot under lead)
- Newport**
(see Aguila under lead)
- Orazada (48)**
(see under silver)
- Owen**
(see Lucile under zinc)
- Paragon**
(see Melrose under silver)
- Pioneer**
(see Longshot under lead)

Pomeroy (2)

(see under zinc)

Providence (3)

(see under lead)

Providence (Deer Trail)

(see Deer Trail under silver)

Redwood

(see Eagle under silver)

Rinchaw

(see Middleport under zinc)

Robena

(see Young America under zinc)

Royal Gold

(see Hubbard under lead)

Santa Rita

(see Cleveland under lead)

Saturday Night-Sunday Morning (46)

(see under lead)

Schoneberg

(see Schrenberg)

Schrenberg (Schoneberg) (35)

Loc: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 18, (32-41E), 1 mi. SE. of Chewelah. **Access:** Road within $\frac{1}{4}$ mi. of the deposit. **Prop:** 20 acres of deeded land. **Owner:** J. J. Schrenberg, Chewelah, Wash. (1900-1949). Leased to R. T. Bennett, Orland, Calif. (1943). **Ore:** Antimony. **Ore min:** Stibnite, chalcopyrite, pyrite. **Gangue:** Quartz, calcite. **Deposit:** Stibnite occurs as very small lenses in dolomite along the footwall of a 3-ft. quartz vein. **Dev:** 165-ft. shaft, 20-ft. shaft. **Ref:** 132, p. 144. 157.

Silver Mountain

(see Daisy-Tempest under silver)

Silver Queen

(see Ark under silver)

Sugar Loaf

(see Vanasse under silver)

Sunday Morning

(see Saturday Night-Sunday Morning under lead)

Sunset (5)

(see under lead)

Tempest

(see Daisy-Tempest under silver)

Tile Creek (15)

Loc: SW $\frac{1}{4}$ sec. 7, (38-39E), on E. Bank of Ryan Cr. N. of Swede Pass. **Elev:** 1,800 ft., about 500 ft. above Columbia R. **Access:** Swede Pass road. **Ore:** Antimony. **Ore min:** Stibnite, scheelite, stibiconite, cervantite. **Deposit:** Quartz lens as much as 2 ft. thick along contact of limy argillite with a sill. Lens of ore now mined out. **Dev:** 35-ft. adit. **Ref:** 132, pp. 144-145.

United Copper (31)

(see under copper)

United Silver Copper

(see United Copper under copper)

United Treasure (11)

(see under silver)

Vanasse (21)

(see under silver)

Venus

(see Deer Trail under silver)

Victory

(see Vanasse under silver)

Wall Street (14)

(see under copper)

Wells Fargo (41)

Loc: NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 36, (31-38E), on E. slope of Huckleberry Range near summit, Deer Trail dist. **Elev:** 3,800 to 3,950 ft. **Access:** Road from Springdale. **Prop:** 80 acres State land. **Owner:** Leased by C. R. Carr, J. M. Carr, and F. B. Carr (1946-1949). Wells-Fargo Mining Co. (1897-1920). **Ore:** Antimony, silver, gold, lead, zinc. **Ore min:** Stibnite, pyrite, jamesonite. **Gangue:** Quartz, barite. **Deposit:** 3- to 5-ft. quartz vein in argillite and dolomite essentially parallel to laminations of the country rock. Jamesonite occurs disseminated in the vein. **Dev:** 2 crosscut adits and a shaft. One adit 125 ft. long, the other 180 ft. **Assays:** Ore shipped av. 7% Sb. A sample across 3 in. of highest grade part of vein at open pit showed 0.02 oz. Au, 2.0 oz. Ag, 13.4% Pb, 0.05% Zn, 6.0% Sb. A grab sample from vein in upper adit showed 0.03 oz. Au, 5.2 oz. Ag, 18.9% Pb, 2.0% Zn, 14.1% Sb. **Prod:** Small shipment of antimony ore in 1937. **Ref:** 30, p. 75. 130, pp. 58-59. 132, pp. 146-148. 141, p. 51. 157. 158. 164, pp. 212-213.

Young America (18)

(see under zinc)

WHATCOM COUNTY**Gold Hill (1)**

(see under silver)

Northern Cascade

(see Gold Hill under silver)

Peterson

(see Gold Hill under silver)

YAKIMA COUNTY**Richmond (1)**

(see under lead)

ARSENIC

Properties—Arsenic has been variously classified as a metal, a metal-like solid, a semi-metal, and a nonmetal, but in its appearance and in some of its other physical and chemical properties it has the qualities of a metal. It is a steel-gray, very brittle, crystalline solid having a hardness of 3.5 and metallic luster. Some other properties are shown in the table on page 12. It sublimes easily to a yellowish vapor which has a garlic-like odor, and it catches fire at about 180° C. It displays two valences, 3 and 5, in its compounds with other elements. The free element is not considered poisonous, but all its soluble inorganic compounds are violent poisons.

Uses—Arsenic finds its greatest use in the form of its poisonous compounds, such as the calcium, lead, and sodium arsenates, lead arsenite, and Paris green, for insecticides and weed killers. Arsenic is used in making glass, enamels, wood preservatives, drugs, dyes, and as alloys with lead and copper. In copper it increases the corrosion resistance and raises the annealing temperature, and for shot metal it is added to lead in amounts up to 1 percent to harden and improve the sphericity of the shot.

Production—Little arsenic is produced in the metal form; most of it is made in the form of white oxide, As_2O_3 . Washington has the distinction of being the first state in this country to produce white arsenic on a commercial scale. Equipment to recover white arsenic at a smelter in Everett was built in 1901, and for several years it was the only producer in the United States. In its first 3 years of operation it produced 2,052 tons of white arsenic, valued at \$135,871, as a byproduct of smelting gold ores, principally from the Monte Cristo district in Snohomish County. The copper smelter at Tacoma began recovering white arsenic in 1907, and it is reported to have produced 3,000 tons in 1920. This plant has produced arsenic intermittently to the present time, and in 1950 it was one of only five producers in this country. Domestic white arsenic is produced principally as a byproduct in smelting ores of copper and lead, and the amount of production depends primarily on the market demand rather than on existing plant capacity. The availability of relatively cheap byproduct arsenic makes it improbable that arsenic mining, as such, will ever be profitable in Washington in normal times, but in the past, two small plants operated briefly on straight arsenic ores. In 1906 a plant near Mineral,

Lewis County, used realgar ore, and the same type of ore was treated in 1920 in a 15-ton mill at Reiter, Snohomish County.

Prices—The price history of arsenic is markedly different from that of the other metals in that the price has changed relatively little over a long period of years. Although the price for white arsenic rose from 8½ cents per pound in August 1922 to 15½ cents in December of that year, the price was 5 cents in 1925 and since then has been relatively stable with very little rise. In fact, the 10-year average from 1941 through 1950 was 4.8 cents, only 0.8 cents higher than the 4.0-cent average for the 10 years from 1925 through 1934. Although the price has been fairly stable, the market demand has varied greatly from year to year, depending upon the demand for arsenical insecticides.

Ore minerals—Native arsenic is fairly common but has been reported in Washington only in the vicinity of Goat Lake in the Monte Cristo district, Snohomish County. The most common arsenic minerals are arsenopyrite, $FeAsS$, containing 46.0 percent arsenic, and the sulfides, realgar, AsS , containing 70.1 percent arsenic, and orpiment, As_2S_3 , containing 61.0 percent arsenic. These are widely distributed throughout the mineralized districts of the state. Perhaps the district best known for its arsenical ores is the Monte Cristo camp in Snohomish County, where arsenopyrite was mined for its gold and silver content. Other, less common arsenic minerals are arsenolite, As_2O_3 ; tennantite, $3Cu_3S \cdot As_2S_5$; proustite, $3Ag_2S \cdot As_2S_3$; the arsenides, löllingite, $FeAs_3$; smaltite, $CoAs_3$; cholanthite, $NiAs_3$; niccolite, $NiAs$; and many rare sulfarsenides of copper, silver, and lead.

Geology—Arsenopyrite is found in a wide variety of occurrences, as with tin and tungsten in pneumatolitic deposits; in quartz veins with gold, silver, galena, sphalerite, pyrite, chalcopyrite, tetrahedrite, calcite, siderite, and many other minerals; with cobalt and nickel ores; in contact-metamorphic deposits; in pegmatites; and disseminated in crystalline rocks, as schist, gneiss, limestone, and serpentine; but it usually favors deep-zone conditions of origin. On the other hand, realgar, orpiment, and arsenolite are usually found at shallow depths. Arsenolite is always a secondary mineral, but realgar and orpiment may be either primary or secondary.

OCCURRENCES

The map showing the numbered arsenic occurrences is plate 2, on page 9 in volume 2.

CHELAN COUNTY

Alta Vista (13)
(see under gold)

Bismarck (7)
(see under zinc)

Black Jack (20)
(see under gold)

Black and White (21)
(see under gold)

Blewett

(see Black Jack, also Peshastin under gold)

Blind Lead

(see under gold)

Blue Jay (6)

(see under copper)

Clagstone (2)

(see under lead)

Culver (14)

(see under gold)

Diamond Dick

(see Black and White under gold)

Doubtful (3)

(see under lead)

Ellen

(see Van Epps under antimony)

Esmeralda

(see under gold)

King Solomon (5)

(see under copper)

King Solomon (Van Epps)

(see Van Epps under antimony)

La Rica

(see Black Jack, also Peshastin under gold)

Moscow (4)

(see under copper)

North Star (15)

(see under gold)

Olympia (16)

(see under gold)

Orphan Boy (8)

(see under silver)

Peshastin (17)

(see under gold)

Phipps (18)

(see under gold)

Pole Pick No. 2

(see Alta Vista under gold)

Quien Sabe (1)

(see under lead)

Red Cap (9)

(see under gold)

Red Hill (10)

(see under gold)

Red Mountain (11)

(see under copper)

Royal

(see Red Mountain under copper)

Sandell (19)

(see under gold)

Snook and Ellen

(see Van Epps under antimony)

Van Epps (12)

(see under antimony)

FERRY COUNTY

Apex

(see Big Chief under lead)

Big Chief (12)

(see under lead)

Blue Horse (3)

(see under silver)

Blue Jacket (4)

(see under silver)

Chief

(see Big Chief under lead)

Colorado (15)

(see under lead)

Gwin (7)

(see under silver)

Hall Creek

(see Gwin under silver)

Juliet (9)

(see under lead)

Juno (5)

(see under silver)

Kentucky Belle (2)

(see under lead)

Little Tom

(see Juliet under lead)

Meteor (10)

(see under silver)

New York (11)

(see under lead)

Pin Money (1)

(see under gold)

Robert E. Lee (13)

(see under antimony)

Rover Bonanza (16)

(see under silver)

Silver Tip (6)

(see under silver)

Stray Dog (8)

(see under silver)

U. S. (14)

(see under lead)

KING COUNTY

Aces Up (10)

(see under silver)

Apex (2)

(see under gold)

Bear Basin (12)

(see under silver)

Bergeson (4)

(see under gold)

Black Diamond (20)

Loc: 1,498 ft. W. and 320 ft. S. of NE. cor. sec. 14, (21-6E), about ½ mi. NE. of Black Diamond. **Elev:** About 700 ft. at collar. **Ore:** Arsenic. **Ore min:** Realgar. **Deposit:** Realgar occurs as disseminated spots and along joint planes in massive arkosic sandstone at depth of 3,274 to 3,284 ft. in oil test well drilled by the Shell Oil Co. in 1947. **Ref:** 158.

Bondholders Syndicate

(see Apex under gold)

Cleopatra (11)

(see under silver)

Coney Basin (7)

(see under gold)

Copper Plate

(see Seattle-Cascade under silver)

Damon and Pythias (1)

(see under gold)

Dawson (8)

(see under lead)

Dutch Miller (13)
(see under copper)

Extra (5)
(see under gold)

Fathers Day (18)
(see under copper)

Franklin
(see Red Crystal)

Goat Mountain (17)
(see under lead)

Green River (21)

Loc: Center sec. 17, (21-7E), in cliff along Green R. **Access:** 2 mi. from railroad. **Owner:** Northern Pacific Railway Co. (1944). **Ore:** Arsenic. **Ore min:** Realgar, orpiment. **Deposit:** Small pods, lenses, and lean disseminations in shear zone in sandstone exposed for 50-ft. length, 4- to 10-ft. width, 40- to 50-ft. depth. **Dev:** 75-ft. adit. **Assays:** 4 samples representing width of 29 ft. gave av. of 1.64% As. **Ref:** 111, p. 5. 157.

Last Chance (3)
(see under gold)

Lennox (16)
(see under gold)

Mona
(see Mono under copper)

Mono (6)
(see under copper)

Monte Carlo (14)
(see under gold)

Mount Phelps (15)
(see under zinc)

Normandie
(see Bergeson under gold)

Pythias
(see Damon and Pythias under gold)

Red Crystal (Franklin) (19)

Loc: Sec. 8, (21-7E), at river level on W. bank of Green R. **Elev:** 500 ft. **Access:** 1 mi. N. of Franklin. **Ore:** Arsenic. **Ore min:** Realgar, orpiment. **Deposit:** Ore minerals occur in a hydrothermally altered dike cutting across sandstone, shale, and coal. Ore appears to be concentrated near the coal bed. **Dev:** 10-ft. adit. **Ref:** 44, p. 46. 130, p. 60.

Seattle-Cascade (9)
(see under silver)

Silver Dollar and Copper Plate
(see Seattle-Cascade under silver)

Sockless Jerry
(see Last Chance under gold)

Triple S
(see Seattle-Cascade under silver)

KITSAP COUNTY

Chico (1)
(see under tin)

Cook-Kitchen
(see Chico under tin)

Kitchen
(see Chico under tin)

KITTITAS COUNTY

American Eagle
(see under gold)

Aurora (1)
(see under gold)

Bob Canson (4)
(see under copper)

Boss
(see under gold)

Edna R. (2)
(see under gold)

Little Kachess Lake (5)
(see under copper)

Lynch
(see Aurora under gold)

Maud O. (3)
(see under gold)

Paramount
(see Aurora under gold)

LEWIS COUNTY

Eagle Peak (2)
(see under copper)

Mineral Creek (1)
(see under zinc)

Paradise (3)
(see under copper)

OKANOGAN COUNTY

Abernathy (24)
(see under copper)

Antimony Gold
(see Abernathy under copper)

Antimony Queen (30)
(see under antimony)

Bellevue (5)
(see under gold)

Black Rock (29A)

Loc: NW¼NE¼ sec. 4, (31-21E), on N. side of Gold Cr. **Access:** Road to within ¼ mi. of property. **Owner:** Wade Smith (1953). **Ore:** Arsenic, gold. **Ore min:** Arsenopyrite, sphalerite. **Deposit:** Quartz vein 1 to 6 in. thick in a 6-ft. crushed zone with graywacke in hanging wall and volcanic rock in footwall. **Dev:** 10-ft. adit. **Ref:** 158.

Bolinger (32)
(see under gold)

Carlquist (9)
(see under antimony)

Chesaw (12)
(see under gold)

Copper World (7)
(see under copper)

Copper World Extension (8)
(see under copper)

Crown Point
(see Imperial under gold)

Crystal Butte (13)
(see under gold)

Dixie Queen
(see Antimony Queen under antimony)

Friday (33)
(see under gold)

Gold Key (22)
(see under gold)

Golden Triangle
(see under gold)

Golden Zone (1)
(see under gold)

Heath (27)
(see under lead)

Homestake (16)
(see under lead)

Horn Silver (4)
(see under silver)

Imperial (19)
(see under gold)

Iron Cap and Snow Cap (25)
(see under gold)

Iron Mask
(see Copper World Extension under copper)

Mazama Pride (23)
(see under gold)

Mid Range (26)
(see under gold)

Montana (20)
(see under copper)

Mother Lode (14)
(see under gold)

New Deal
(see Antimony Queen under antimony)

Olentangy (10)
(see under gold)

Pyrargyrite
(see Ruby under silver)

Rainbow (6)
(see under gold)

Rattlesnake (28)
(see under gold)

Reco (11)
(see under gold)

Red Shirt (29)
(see under gold)

Reedy
(see Antimony Queen under antimony)

Rosalind (21)
(see under gold)

Ruby (2)
(see under silver)

Saint (3)
(see under gold)

Salmon River (17)
(see under silver)

Second Prize
(see under gold)

Shelby
(see under silver)

Sherman (18)
(see under lead)

Silver Ledge (31)
(see under gold)

Silver Seal
(see Antimony Queen under antimony)

Silver Star
(see under silver)

Silver Tip
(see Starr under molybdenum)

Snow Cap
(see Iron Cap and Snow Cap under gold)

Standard
(see Sherman under lead)

Starr (15)
(see under molybdenum)

Tom Hal
(see Friday under gold)

PEND OREILLE COUNTY

Alger and McCullough (2)
(see under copper)

Bead Lake (3)
(see under lead)

Blue Jim (1)
(see under silver)

Conquest
(see Kootenai Conquest under lead)

Kootenai Conquest (4)
(see under lead)

McCullough
(see Alger and McCullough under copper)

Snowbird and Stanley (5)
(see under lead)

Stanley
(see Snowbird and Stanley under lead)

West
(see Blue Jim under silver)

PIERCE COUNTY

Clipper (1)
(see under copper)

Mothers Day
(see Clipper under copper)

Silver Creek (2)
(see under gold)

SKAGIT COUNTY

Alta (6)
(see under lead)

Alverson (1)
(see under nickel)

Boston (7)

(see under lead)

Cerrico

(see under lead)

Chicago (8)

(see under lead)

Clear Lake (2)**Loc:** Near Clear Lk. **Ore:** Arsenic. **Ore min:** Realgar. **Ref:** 141, pp. 54-55.**Cultus Mountain (4)**

(see under nickel)

Higgins Mountain

(see Lawrence under copper)

Lawrence (5)

(see under copper)

Nookachamps Creek (3)**Loc:** Near S. line sec. 22, (34-5E), on the upper part of Nookachamps Cr. **Ore:** Arsenic. **Ore min:** Realgar. **Deposit:** Realgar float found as boulders in the stream is not much rounded and may be near the source. **Ref:** 158.

SKAMANIA COUNTY

Commonwealth (1)

(see under copper)

Perry (2)

(see under gold)

SNOHOMISH COUNTY

Ala-Dickson (27)

(see under copper)

Alleghany

(see Foggy under copper)

American Arsenic

(see Reiter)

Argonaut and Typo (49)

(see under gold)

Ben Lomond

(see Rainy under gold)

Big Four (24)

(see under lead)

Blue Rock (36)

(see under copper)

Bonanza

(see Mineral Center under gold)

Bonanza Queen (10)

(see under copper)

Border Queen (31)

(see under copper)

Boston

(see Butte and Boston)

Bullet (8)

(see under copper)

Butte and Boston**Loc:** Index dist. **Owner:** Cascade Arsenic Mining Co. (1902). **Ore:** Arsenic. **Ref:** 105, 9/02, p. 138.**Calumet (32)**

(see under gold)

Cassidy (50)

(see under gold)

Chickamun

(see Forest-Chickamun under copper)

Clara Thompson

(see Jasperson under gold)

Cleveland (13)

(see under copper)

Commonwealth

(see Jasperson under gold)

Consolidated

(see under gold)

Copper Chief (60)

(see under copper)

Copper Independent (14)

(see under gold)

Daisy (57)

(see under gold)

Dry Creek

(see under gold)

Eclipse (15)

(see under gold)

Edison (42)

(see under gold)

Eldred (33)

(see under copper)

Engdahl (61)

(see under zinc)

Feldt (1)

(see under silver)

Foggy (40)

(see under copper)

Forest-Chickamun (5)

(see under copper)

"48-55" (29)

(see under copper)

"45" (23)

(see under silver)

Garnet

(see "48-55" under copper)

Glory of the Mountain (35)

(see under gold)

Gold Eagle (43)

(see under gold)

Golden Chord

(see Justice under gold)

Granite and Maud (16)

(see under gold)

Great Scott (56)

(see under gold)

Hicks

(see Sultan King under copper)

Hustler (34)

(see under copper)

Imperial (17)

(see under copper)

Independent

(see Copper Independent under gold)

Index Gold Mines, Inc. (68)

(see under gold)

Iron Clad (69)

(see under gold)

Jasperon (62)

(see under gold)

Jim Dandy (63)

(see under gold)

Justice (51)

(see under gold)

Lida (44)

(see under copper)

Lily James (11)

(see under gold)

Lily of the West (37)

(see under gold)

Little Chief (28)

(see under copper)

Louise

(see Mineral Center under gold)

Lucky Strike (9)

Loc: NE¼ sec. 24, (30-9E). **Access:** On edge of the highway ½ mi. W. of Silverton. **Prop:** 1 claim. **Owner:** V. D. McCrory, Erick Shedden, and James Bossart (1942). **Ore:** Arsenic. **Ore min:** Pyrite, arsenical pyrrhotite. **Deposit:** 12-in. vein of heavy sulfide ore pinches out in 20 ft. of drifting. **Dev:** 80-ft. adit. **Ref:** 158.

Lulu (18)

(see under gold)

McCombs

(see Jasperon under gold)

Mackinaw (58)

(see under copper)

Magus

(see "45" under silver)

Martin Engdahl (64)

(see under lead)

Maud

(see Granite and Maud under gold)

Milwaukee (25)

(see under zinc)

Mineral Center (45)

(see under gold)

Mineral Mountain (46)

Loc: NW¼ sec. 31, (29-11E), Silver Cr. dist. **Ore:** Arsenic. **Ore min:** Arsenopyrite. **Ref:** 14, p. 35.

Monte Cristo (52)

(see under gold)

Mountain Cedar (30)

(see under copper)

Mystery (Monte Cristo, Pride)

(see Monte Cristo under gold)

Mystery (Mountain Cedar, Paystreak)

(see Mountain Cedar under copper)

National (47)

(see under copper)

Nemo (12)

(see under gold)

New York (19)

(see under copper)

North Star

(see Sunrise under gold)

O and B (41)

(see under copper)

Oldfield

(see Sunrise under gold)

Ore Recoveries (20)

(see under copper)

Paystreak

(see Mountain Cedar under copper)

Peabody (53)

(see under gold)

Pelican (3)

(see under gold)

Penn

(see Foggy under copper)

Perm

(see under gold)

Philo (54)

(see under copper)

Pride

(see Monte Cristo under gold)

Queen Anne (4)

(see under gold)

Rainy (55)

(see under gold)

Reiter (American Arsenic) (71)

Loc: Sec. 1, (27-9E) and sec. 6, (27-10E), near the headwaters of Hogarty Cr. **Elev:** 2,400 ft. **Access:** Trail up the N. side of Hogarty Cr. **Owner:** Julius Haun, Gold Bar, Wash. American Arsenic Mining Co. (1921-1923). Western Copper Mining Co. (1924-1926). **Ore:** Arsenic. **Ore min:** Realgar, orpiment, arsenolite. **Deposit:** Ore occurs as 2- to 12-in. fracture fillings in granodiorite. Several smaller veinlets. **Dev:** 150-ft. adit, another short adit, and several open cuts. **Assays:** Owners est. large body of ore av. 20% arsenic sulfides. **Prod:** 22 tons of red arsenic in 1922-1923. **Ref:** 14, pp. 15-16. 97, 1922, p. 64. 98, 1925, p. 1838; 1926, p. 1600. 129, pp. 291-293. 130, pp. 59-60. 141, pp. 22, 54, 55.

Ruby King (65)

(see under gold)

Sam Strom (6)

(see under copper)

Silver Horseshoe (26)

(see under silver)

Silver Slipper (66)

(see under gold)

Sultan King (59)

(see under copper)

Sultan Queen

(see Sultan King under copper)

Sunrise (2)

(see under gold)

Sunset (38)

(see under gold)

Texas (70)

(see under gold)

Typo

(see Argonaut and Typo under gold)

Union (39)

(see under gold)

Vesper Peak

(see "48-55" under copper)

Virginia (21)

(see under copper)

Washington-Iowa

(see Mineral Center under gold)

Webster

(see Jasperson under gold)

Weden Creek

(see Mackinaw under copper)

Westland (67)

(see under copper)

White Gander (7)

(see under copper)

Wild Rose (48)

(see under copper)

Winter Coon (22)

(see under gold)

STEVENS COUNTY

Acme (4)

(see under lead)

Banner

(see Chinto under copper)

Centennial (2)

(see under copper)

Chewelah Consolidated (6)

(see under lead)

Chinto (7)

(see under copper)

Chloride (13)

(see under lead)

Cleveland (12)

(see under lead)

Daisy

(see Daisy-Tempest under silver)

Daisy-Tempest (5)

(see under silver)

Dora

(see Acme under lead)

Edna (11)

(see under copper)

Germania (15)

(see under tungsten)

Gold Bar (3)

(see under gold)

Juno-Echo (9)

(see under copper)

King

(see Edna under copper)

Orazada (16)

(see under silver)

Santa Rita

(see Cleveland under lead)

Silver Mountain

(see Daisy-Tempest under silver)

Tempest

(see Daisy-Tempest under silver)

Togo (14)

(see under copper)

United Copper (8)

(see under copper)

United Silver Copper

(see United Copper under copper)

Western Molybdenum

(see Juno-Echo under copper)

White Horse (1)

(see under copper)

Windfall (10)

(see under copper)

WHATCOM COUNTY

Allen Basin (4)

(see under gold)

Chancellor (2)

(see under gold)

Great Excelsior (1)

(see under gold)

Indiana

(see Chancellor under gold)

Lincoln

(see Great Excelsior under gold)

Mammoth (3)

(see under gold)

President

(see Great Excelsior under gold)

Quinn**Loc:** Whatcom County (?). **Owner:** Ed Quinn, Bellingham, Wash. (1942). **Ore:** Arsenic. **Ore min:** Realgar, orpiment. **Gangue:** Quartz. **Ref:** 158.**Tacoma (5)**

(see under gold)

YAKIMA COUNTY

Bird (4)

(see under tungsten)

Chinook (1)

(see under copper)

Copper Mining Co. (5)

(see under copper)

Garibaldi (6)
(see under tungsten)

Keystone (3)
(see under copper)

New Find (7)
(see under copper)

Richmond (2)
(see under lead)

BARIUM

Properties—Barium is a soft silver-white metal that is like lead in appearance. It belongs to the alkaline earth group and resembles calcium chemically. Although the metal is not especially heavy, many of its compounds have high density, and many of their uses depend upon this property. The pure metal is unstable and is the most active of the alkaline earth metals except radium. It reacts vigorously with water to produce hydrogen and barium hydroxide. All soluble barium salts are very poisonous. They give a green color to the flame when placed in a fire. Other properties are given in the table on page 12.

Uses—The metal has few uses, but its compounds have several important uses, which are mentioned under barite in Part I of this report. A thin film of barium is used to lubricate the rotor operating at high speed in a vacuum in an X-ray tube, where ordinary lubricants fail. A high-nickel alloy is used in spark plugs, and alloys with lead have been made, but at the present time the only important use for barium metal is as an alloy with magnesium and aluminum as a "getter" in electronic tubes. (A "getter" is a volatile metal introduced into a vacuum tube for removing traces of undesirable gases.) A commonly used "getter" alloy contains one part barium, one part aluminum, and two of magnesium.

OCCURRENCES

The occurrences of barite, the principal ore mineral of barium, are listed in Part I of this report.

BERYLLIUM

Properties—Beryllium, also called glucinum, is a steel-gray to silver-white nonductile metal which is brittle at room temperatures. It is similar to magnesium and aluminum in appearance and chemical composition. It weighs only about two-thirds as much as aluminum but is much harder (it will scratch glass but not quartz), has a much higher melting point, is more corrosion resistant, and is four times as elastic as aluminum and almost as elastic as steel. It is capable of taking a high polish. An interesting property is that of transmitting sound at a very high velocity, about 2.5 times that of steel, which apparently has the next highest sound-transmission velocity. The metal has a high melting point, but it distills rapidly at a temperature only slightly greater than its melting point. Other properties are given in the table on page 12.

Uses—Military uses during World War II accounted for approximately 99 percent of domestic consumption, but peacetime uses are increasing. The pure metal is used in neutron generators and for windows in X-ray tubes. The metal and its compounds are of major interest in the atomic-energy program for its moderating effect upon the fast neutrons emitted by the fission of U-235 and plutonium, and probably for other undisclosed ap-

Production—In 1950 there were only two reported producers of barium in this country; their total output amounted to several thousand pounds annually. Barite is produced in large quantities in the United States, and small amounts have been mined in Washington in the past, but all but an insignificant portion of this production is for industrial mineral uses rather than as an ore of barium.

Prices—The price of the metal in 1932 was \$7.50 to \$10.00 per pound, and in 1943 it sold for from \$5.00 to \$8.00 per pound. In 1950 one producer quoted a price of \$6.00 per pound in 1,000-pound lots. Early in 1954 the price of barium metal in rod form was \$13.50 per pound in 5- to 10-pound lots.

Ore minerals—The principal ore mineral is the sulfate, barite, BaSO_4 , containing 58.8 percent barium; but the carbonate, witherite, BaCO_3 , containing 69.7 percent barium, is not uncommon. Barium is widely distributed as a minor constituent of silicate minerals throughout the igneous rocks.

Geology—Barite occurs as pods, large veins, and beds in sedimentary rocks and as cementing material in sandstone. It is a common gangue mineral in ore deposits.

plications. Beryllium oxide is used in ceramics such as spark plugs and is receiving much attention in the field of cermets, combined metals and ceramics, for such superduty refractory applications as jet engines and gas turbines. Beryllium compounds are used in fluorescent screens and lights, but since mid-1949 this use has declined sharply due to the use of substitutes. The high velocity of sound in pure beryllium metal may bring applications in the field of acoustics. The major use for the metal is in alloys with iron, aluminum, magnesium, zinc, nickel, and copper, but especially with copper, where it develops properties somewhat analogous to those imparted to steel by carbon. Addition of up to a few percent of beryllium to copper produces a series of alloys that are heat treatable, high strength, highly conductive, corrosion resistant, fatigue resistant, and nonsparking. These alloys have many exacting uses in the manufacture of electrical and other instruments and equipment.

Production—A large part of this country's beryllium supply is imported, and the demand may be expected to increase in the future, so the pressure for discovery of new domestic supplies probably will increase. The only production to date in Washington was a few hundred

pounds of beryl mined from the Cannon (Calispell Peak, Railway Dike) pegmatite deposit in central-eastern Stevens County in 1952.

Prices—The price for beryllium usually is quoted as price per short ton unit (20 pounds) of BeO in beryl ore containing 10 to 12 percent BeO. For many years beryl ore was quoted at \$3.00 per short ton unit, but after 1940 the price rose to \$7.50 in 1942 and \$14.50 in 1944. The following year the price dropped to \$9.00, but by 1948 it had risen to \$24.00. In September 1952 it was \$38.50, and in March 1953 it was at a record high of as much as \$50.00 for the best grades.

Ore minerals—The only commercial ore mineral of beryllium is beryl, a complex beryllium aluminum silicate, $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$. When pure it contains 13.9 percent BeO, but it is seldom pure, and the usual range is from 9 to 11 percent BeO. Other beryllium minerals, which if found

in sufficient quantity could be sources of the metal, are phenacite, Be_2SiO_4 , containing 45.5 percent BeO; chrysoberyl, BeAl_2O_4 , containing 19.7 percent BeO; helvite, $3(\text{Mn,Fe})\text{BeSiO}_4 \cdot \text{MnS}$, containing 12.6 to 13.5 percent BeO; gadolinite, $\text{Be}_2\text{FeY}_2\text{Si}_2\text{O}_{10}$, containing 10.7 percent BeO; and beryllonite, NaBePO_4 , containing 19.7 percent BeO. Of these minerals, only beryl is known to occur in Washington.

Geology—Beryl occurs almost exclusively in pegmatite deposits in granite, in which it seldom constitutes more than 1 percent of the total. It occurs as distinct hexagonal crystals or as irregular masses, some of which may weigh as much as several tons. It is distributed sparsely and erratically, but in some pegmatites it is concentrated in recognizable zones. Most of the other potential beryllium ore minerals also occur in pegmatites, but helvite has been found in contact-metamorphic deposits.

OCCURRENCES

The beryl occurrences in Washington are described in Part I of this report. The Cannon (Calispell Peak, Railway Dike) deposit is described in a little more detail on page 356 here in Part II under uranium, Stevens

County. Another reported occurrence of beryl, not included in Part I, is described in Part II, page 37, under the name of Gemini, under chromium, Ferry County.

BISMUTH

Properties—Bismuth is a crystalline metal having a hardness of 2.0 to 2.5, a high luster, and white color with a reddish tinge. It is brittle, but when heated to 100° C. is slightly ductile. Recent research has resulted in the manufacture of ductile bismuth which can be made into wire and ribbon and which will not age-harden or crystallize. Like antimony and gallium, bismuth expands (3.3 percent) when it solidifies from a melt. It is the most diamagnetic (repels a magnetic field) of the metals. It oxidizes easily, producing an iridescent film, and when heated in air it burns with a blue flame. Its electrical conductivity is low, and only mercury has a lower thermal conductivity. Chemically, it is similar to arsenic and antimony. Other properties are shown in the table on page 12.

Uses—The recently developed ductile bismuth wire and ribbon are being used in electrical instruments, and bismuth has been used as an additive in stainless steel. The largest use as a metal is in alloys with lead and, to a lesser extent, with tin and cadmium. These alloys have some valuable properties in common with pure bismuth, particularly that of expanding when solidifying and of having low melting points—as low as 100° F. (38° C.). The low-melting point alloys are used for special solders, safety fuses, automatic sprinklers, dental amalgams, and for making sharp castings of objects which would be subject to damage by high temperatures. Because of its low absorption cross section for thermal neutrons, bismuth has attracted attention as a possible coolant for nuclear reactors. The greatest use (about 80 percent) is in the nonmetallic state, as compounds in medicine and industrial chemistry.

Production—The United States is about 50 percent self-sufficient in bismuth. The metal is reported to have

been produced at four plants in this country in 1950. All this production was a byproduct of smelting lead and copper ores. No production has been reported from Washington.

Prices—For many years the bismuth market was effectively controlled by agreements among the relatively few foreign producers, and the United States market closely followed that of London. The New York price ranged between \$1.70 and \$2.15 per pound in 1910, rose as high as \$4.00 in 1916, had returned to the earlier level by 1921, and has remained at about that level ever since, with a low of \$1.00 in 1930 and a high of \$3.35 in 1926. Since 1930 the price has been steady, rising intermittently by small increments from \$1.00 per pound in 1930 to \$2.25 in September 1950, at which price it has remained to June 1955. Bismuth ores have rarely been marketable as such in the United States, but at times lead or copper ores containing 3 percent or more of bismuth have received payment for their bismuth content. In general, bismuth ores should contain at least 10 percent of bismuth metal, and ores as rich as 65 percent are available from foreign countries. It is customary for the lead and copper smelters to consider the bismuth content of ore received as being objectionable rather than adding to the value of the ore.

Ore minerals—Bismuth commonly occurs native. The native metal and the sulfide, bismuthinite, Bi_2S_3 , containing 81.2 percent bismuth, are its principal ores. The only bismuth minerals reported in Washington are the lead-bismuth sulfide, cosalite, $2\text{PbS} \cdot \text{Bi}_2\text{S}_3$, containing 43.5 percent bismuth, and the basic carbonate, bismutite, $\text{Bi}_2\text{O}_3 \cdot \text{CO}_2 \cdot \text{H}_2\text{O}$, containing 79.0 percent bismuth. Other relatively rare bismuth minerals are two silicates, the oxides, carbonate, molybdate, vanadate, arsenate, and several sulfosalts and tellurides.

Geology—In quartz veins bismuth occasionally is the principal ore, but generally it occurs as an accessory in many minerals and ores of copper, gold, silver, lead, and zinc. In places it is associated with tin, elsewhere with cobalt and uranium, and with tungsten. In addition to

vein deposits, it is found in contact-metamorphic deposits and in pegmatites. In Washington, bismuth minerals have been found in a pegmatite, in several wolframite-bearing quartz veins, and in mixed copper-gold-silver-lead-zinc ores.

OCCURRENCES

The map showing the numbered bismuth occurrences is plate 3, on page 11 in volume 2.

CHELAN COUNTY

Keefer Brothers (1)
(see under molybdenum)

FERRY COUNTY

Talisman (1)
(see under copper)

GRANT COUNTY

Black-Rosauer (1)
(see under silver)

KING COUNTY

Pedro
(see under copper)

OKANOGAN COUNTY

Boundary
(see Wolframite under tungsten)

Ferris R. Ford
(see Wolframite under tungsten)

Hatfield
(see Wolframite under tungsten)

Key (3)
(see under silver)

Properties—Boron is generally considered a nonmetallic element, but sometimes it is classified as a metal, and in some respects it does act as a metal. Chemically, boron is similar to silicon and carbon and is markedly nonmetallic in its reactions. It acts as a reducing agent, and with few exceptions it is trivalent. In some physical properties it slightly resembles the metals. It forms black crystals nearly as hard as diamonds but also occurs in an amorphous form. The melting point is very high and the heat resistance is high, as is also the resistance to an electric current, although electrical resistance decreases with increased temperature. Other properties are given in the table on page 12.

Uses—Boron is added to melts of copper and other metals to deoxidize the metal before casting. Boron master alloys are added to medium- and high-carbon steels to confer depth hardenability and to intensify the effects of other ferro-alloys used, allowing large reduction in the amounts of other ferro-alloys needed to

Mountain Beaver (2)
(see under gold)

Wolframite (1)
(see under tungsten)

SNOHOMISH COUNTY

Lucky Strike (1)
(see under copper)

Silver Coin (2)
(see under gold)

STEVENS COUNTY

Calispell Peak
(see Cannon under uranium)

Cannon (2)
(see under uranium)

Germania (5)
(see under tungsten)

Maple Leaf
(see Melrose under silver)

Melrose (1)
(see under silver)

Paragon
(see Melrose under silver)

Railway Dike
(see Cannon under uranium)

S. L. (4)
(see under tungsten)

Tungsten King (3)
(see under tungsten)

BORON

produce the desired effects. Boron carbide is the hardest commercial synthetic substance known; it is used for abrasives, for certain heavy-duty wear-resistance applications, and, because of its excellent refractory qualities, in jet engines. Metallic boron has only limited uses, but the nonmetallic compounds, borax and boric acid, have a very wide range of important uses as oxidation resistant coatings on metals, in glass manufacture, as fluxes, in soap, as trace-element plant food, and in industrial chemical processes; also, they have a large number of minor uses.

Production—Practically all of the minerals from which boron is extracted are produced in the desert areas of southern California. None has been produced in Washington, and no production may be anticipated in the future.

Prices—Elemental boron was quoted in 1955 at \$10 to \$13 per pound for metal of 90 to 92 percent purity and \$12 to \$15 per pound for metal of 95 to 97 percent purity.

Technical grade borax sold at \$41.50 per ton during World War II, rose to \$44.50 in 1946, and was selling at \$33.25 per ton in the latter part of 1950.

Ore minerals—Boron minerals which have been produced commercially are borax, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, containing 36.6 percent B_2O_3 ; kernite, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$, containing 51.0 percent B_2O_3 ; colemanite, $\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$, containing 50.9 percent B_2O_3 ; ulexite, $\text{NaCaB}_3\text{O}_9 \cdot 8\text{H}_2\text{O}$, containing 43.0 percent B_2O_3 ; sassolite, H_3BO_3 , containing 56.4 percent B_2O_3 ; and boracite, $\text{Mg}_3\text{Cl}_2\text{B}_{14}\text{O}_{24}$, containing 62.4 percent B_2O_3 . At least four boron-bearing silicate minerals are known in Washington, but none of

these is now considered as an even remotely possible ore of boron. These are dumortierite, $8\text{Al}_2\text{O}_3 \cdot \text{B}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$, containing 5.5 percent B_2O_3 ; tourmaline, $\text{H}_7\text{Al}_3(\text{B},\text{OH})_3\text{Si}_4\text{O}_{19}$, about 6.6 percent B_2O_3 ; axinite, $\text{HCa}_2(\text{Mn},\text{Fe})\text{BAI}_2\text{Si}_4\text{O}_{16}$, about 6.2 percent B_2O_3 ; and ludwigite, $(\text{Mg},\text{Fe})_2\text{O}_2\text{FeBO}_3$, about 7.7 percent B_2O_3 .

Geology—The commercial borates occur in solution and in saline crusts around and in the muds of playa lakes and in older sedimentary rocks which represent ancient playa lake deposits. The borosilicate minerals are widely distributed in igneous rocks, particularly the granitic rocks.

OCCURRENCES

The Washington occurrences of borates, tourmaline, and dumortierite are discussed under miscellaneous non-metallic minerals in Part I of this report. Axinite has been found in the Blewett district in Chelan County and near Anacortes in Skagit County. Ludwigite has been

reported² in considerable quantity at the Read iron deposit in Stevens County, described here in Part II on page 204.

²Broughton, W. A., Some magnetite deposits of Stevens and Okanogan Counties. Washington: Washington Div. Geol. Rept. Inv. 14, p. 14, 1945.

CADMIUM

Properties—Cadmium is a soft bluish-white malleable and ductile metal. It is similar chemically and in appearance to zinc, with which it is usually found associated, but it is more malleable and ductile than zinc. It is easily fusible, is corrosion-resistant, and capable of taking a high polish. In most of its compounds it is bivalent. Other properties are shown in the table on page 12.

Uses—The largest use is as a protective coating on iron and steel, and in most respects it is better for this purpose than is zinc. In alloys with nickel, copper, and silver, cadmium is used in important quantities as bearing metal for heavy-duty applications. The third most important use is in the form of its compounds with sulfur and selenium as pigments in paint, rubber, ceramics, ink, and other products. Some of the cadmium alloys, such as Woods metal (12.5% cadmium), have very low melting points and are used in applications where this property is required, such as for electric fuses and automatic sprinklers. The metal has uses in atomic energy technology, in aluminum solder, and in electrical conductor wires. Small additions of cadmium increase the strength of copper wire without sacrificing conductivity. Cadmium compounds are used as insecticides, in medicine, photography, ceramics, and as phosphors. They also have other minor uses.

Production—All cadmium production is as a byproduct of smelting zinc-bearing ores. In 1950 there were 13 plants producing the metal in the United States. In Washington, cadmium has been found in zinc-lead ores in Pend Oreille,

Stevens, and Ferry Counties, and although no records are available it is known that smelter payments have been made, in part, on the basis of the cadmium content of some of these ores which were shipped primarily for their zinc values.

Prices—Cadmium was quoted at \$3.20 per pound in Germany in 1875. The price was \$1.00 in the United States in 1906, when production first started in this country. The price continued to drop to 52 cents by 1909, then rose to \$1.56 in 1916, and dropped to an average of 55 cents for the period 1931 to 1934. It rose to \$1.22 in 1937, only to drop back to 59 cents in 1939, and then start a rise to the high of \$2.55 in 1950 and 1952. In December 1953 the price was \$2.00 per pound, but shortly thereafter it dropped to \$1.70, where it remained through June 1955.

Ore minerals—Only the rare sulfide, greenockite, CdS , containing 77.8 percent cadmium; the oxide, cadmium oxide, CdO , containing 87.5 percent cadmium; and the carbonate, octavite, contain cadmium as the chief constituents.

Geology—No deposits of cadmium ore are known, but greenockite is fairly commonly associated with sphalerite as a greenish-yellow earthy coating. As such it is a secondary deposit, the cadmium probably being derived from alteration of cadmium-bearing sphalerite. Any ore in which there is sphalerite might also contain cadmium. The zinc concentrates from the Tri-State district average about 0.35 percent cadmium, but western zinc concentrates seldom contain more than 0.2 percent.

OCCURRENCES

The map showing the numbered cadmium occurrences is plate 3, on page 11 in volume 2.

FERRY COUNTY

Laurier

(see Talisman under copper)

Talisman (1)

(see under copper)

PEND OREILLE COUNTY

American Zinc, Lead and Smelting Co.

(see under zinc)

Bella May (new adit) (3)

(see under zinc)

Clark

(see Josephine under zinc)

Grandview mine (2)

(see under zinc)

Josephine (1)

(see under zinc)

Pend Oreille Mines & Metals Co.

(see under zinc)

STEVENS COUNTY

Admiral Consolidated (2)

(see under zinc)

Boundary Silver Lead

(see Lucile under zinc)

Clugston

(see Silver Trail under lead)

Dead Medicine

(see Silver Trail under lead)

Longshot (5)

(see under lead)

Lucile (1)

(see under zinc)

Moonlite

(see Morning under silver)

Morning (4)

(see under silver)

Newland

(see Longshot under lead)

Owen

(see Lucile under zinc)

Pioneer

(see Longshot under lead)

Silver Trail (3)

(see under lead)

CALCIUM

Properties—Calcium is a lustrous silver-white malleable and ductile metal which is nearly as soft as lead. It is light in weight, being only about one and a half times as heavy as water. Calcium is the fifth most abundant element in the earth's crust, comprising 3.6 percent of the outer 10-mile shell. It is one of the alkaline earth elements, chemically similar to strontium and barium. It has a strong affinity for oxygen, tarnishes readily, reacts with water, and burns with a brilliant crimson flame. Other properties are shown in the table on page 12.

Uses—Metallic calcium and calcium-silicon, calcium-manganese, and other alloys are used as deoxidizers and scavengers in steel making. The element has some use as an alloy constituent with ferrous and nonferrous metals. Up to 0.35 percent of calcium is added to magnesium to reduce heat-treating time and improve the surface of castings. In additions of up to 0.5 percent it hardens and strengthens lead, and in this use it is an important substitute for antimony. It also substitutes for tin in some lead alloys. Calcium is used as a "getter" in vacuum tubes, and is used as a reducing agent in processes for the recovery of uranium, titanium, and vanadium from their ores. Calcium minerals and compounds have many important large-scale uses in industry, the building trades, and agriculture, but these uses are all in the classification of industrial, or nonmetallic, minerals.

Production—The first commercial production of metallic calcium in this country was in 1936. In 1950 there were only two producers, one in Michigan and one in Connecticut. Since calcium minerals are extremely abundant

and widely distributed throughout the United States, it is obvious that factors other than occurrences of the "ore" control the amount of the metal produced and the location of the producing plants.

Prices—Up to 1918 the price of metallic calcium was at or above \$20 per pound, thus restricting the metal to only minor uses. Later the price dropped to \$1.50, and in 1938 to 65 cents a pound. In 1941 it was \$1.25, in 1944 it rose to \$1.85, in 1948 to \$1.95, and in 1949 to \$2.05, where it remained through June 1955.

Ore minerals—Calcium never occurs free in nature but is combined most commonly as the carbonates, calcite, CaCO_3 , containing 40.0 percent calcium, and dolomite, $\text{CaMg}(\text{CO}_3)_2$, containing 21.7 percent calcium; less commonly as the sulfates, gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, containing 23.2 percent calcium, and anhydrite, CaSO_4 , containing 29.4 percent calcium; and the fluoride, fluorite, CaF_2 , containing 51.1 percent calcium. Calcium is an essential constituent of many abundant rock-forming silicate minerals, especially anorthite and the other plagioclase feldspars, the amphiboles, the pyroxenes, garnet, epidote, and scapolite.

Geology—Calcite and dolomite, which might be considered the principal ores of calcium, are two of the most common of minerals, occurring in all three major rock classes—sedimentary, igneous, and metamorphic. The calcium sulfate minerals likewise are widely distributed, and the silicate minerals containing calcium are extremely common and abundant in almost all rock types.

OCCURRENCES

The occurrences of dolomite, calcium carbonate rocks (under limestone), and gypsum are listed in Part I of this report.

CERIUM

Properties—Cerium is the commonest of the group of 15 rare-earth elements. Pure cerium is seldom produced, except experimentally, as the properties of the rare earths are so similar, and they can be separated only with difficulty. Commercial cerium usually includes five rare-earth elements, in the following approximate percentages: cerium, 45; lanthanum, 25; neodymium and praseodymium, 15; and samarium, 10. Cerium is a lustrous iron-gray malleable and very ductile metal which is about as soft as lead. Of all the metals it has the greatest coefficient of expansion. It conducts electricity poorly and heat fairly well. It is a powerful reducing agent, and is attacked slowly by cold water and more rapidly by hot water. Other properties are shown in the table on page 12.

Uses—The best known use of cerium is as misch metal, alloyed with iron to give a brittle product which emits copious sparks when abraded and which is used for lighter flints. Another well-known, but declining use is as a minor constituent with thorium in treating gas mantles. Cerium is used in the cores of carbon electrodes for arc lights, and its compounds are used in optical glass, in the ceramic and textile industries, and in medicine. Cerium is alloyed with aluminum and magnesium for strength and hardness, it is added to special kinds of nodular cast iron, and in steel it confers hot workability and strength. In the past, only a few hundred pounds per year of cerium metal were consumed in this country, but the discovery in 1949 of very large reserves (one estimate gives 3 billion pounds) of high-grade rare-earth ores in California has opened up the possibility for development of entirely new large-scale uses. Large expansion of production should bring the price down, and lower prices for the metal may be expected to result in a large increase in its use in steel manufacture.

Production—In 1950 there were only three important producers of cerium or misch metal in this country, and these were all located in New York or New Jersey. The

domestic ore is largely monazite from placers in Idaho and Florida, but the California bastnaesite ores may be in production in the near future. Although monazite is known to occur in placer sands in Washington, and as a minor constituent of pegmatitic phases of granite in the Sherman Pass region of Ferry County, none has yet been produced.

Prices—The prices of cerium metal, misch metal, and cerium alloys have not changed greatly in recent years. In 1928 ferrocerium sold at from \$5.75 to \$8.00 per pound, and in 1950 the price was \$8.00. In 1935 ferrocerium and misch metal sold at \$6.00 to \$10.00, and in 1950 misch metal was \$4.50 per pound. Cerium metal was quoted at \$25.00 per pound both in 1935 and 1950.

Ore minerals—The principal ore of cerium has been monazite, a phosphate, $(\text{Ce,La,Di})\text{PO}_4$, containing about 32 percent Ce_2O_3 and about 65 percent rare earths; but large deposits in California of bastnaesite, a fluorocarbonate of cerium and other rare earths, $(\text{Ce,F})\text{CO}_3$, containing up to 40 percent rare-earth oxides, probably will be an important source of ore in the future. Allanite (orthite), a complex silicate of thorium, cerium and other rare earths, aluminum, iron, and calcium has been reported in Washington. There are several dozen rare-earth fluorides, carbonates, silicates, fluosilicates, phosphates, titanates, tantalates, and columbates.

Geology—The rare earths are not really as rare as they seem. In reality they are more abundant than zinc, lead, or arsenic, but they are widely and sparsely disseminated, mostly as monazite, in igneous rocks, especially granites, gneisses, and pegmatites. They rarely make up more than a very small fraction of 1 percent of the containing rock. The only common type of concentration is in placer stream gravels and beach sands. Bastnaesite associated with barite and fluorite has been found in commercial-grade concentrations in lode deposits.

OCCURRENCES

The map showing the numbered cerium occurrences is plate 3, on page 11 in volume 2.

DOUGLAS COUNTY

Columbia River Placer
(see under gold, placer)

FERRY COUNTY

Sherman Creek Pass (2)
(see under uranium)

Wilmont Bar Placer (1)
(see under gold, placer)

GRAYS HARBOR COUNTY

Moclips Placer (1)

Loc: Beach at Moclips. **Ore:** Cerium, thorium. **Ore min:** Monazite, chromite, zircon. **Gangue:** Olivine, quartz. **Deposit:**

Ocean beach sand. **Assays:** Sample of natural beach sand showed 71.5 lb. monazite, 24 lb. chromite, 82 lb. ilmenite, and 17¢ gold and platinum per ton. **Ref:** 38, p. 160. 38-A, pp. 1218-1219. 126, p. 14.

KING COUNTY

Seattle Placer
(see under gold, placer)

Snoqualmie
(see under thorium)

OKANOGAN COUNTY

Happy Hill (1)
(see under uranium)

PEND OREILLE COUNTY

Dry Canyon (1)
(see under thorium)

CHROMIUM

Properties—Chromium is a bluish-white metal which has a high luster and is capable of taking a brilliant polish. It is tough, resistant to corrosion, and fairly ductile. At temperatures up to 300° C. chromium is not oxidized or corroded by air, oxygen, or chlorine. Electrolytic chromium is malleable, but metal produced by chemical reduction is brittle. Likewise, cast chromium has a hardness of 4 to 5, but chromium plating (electrolytic) has a hardness of 9, which is harder than case-hardened steel. The soluble compounds are very poisonous. Other properties are given in the table on page 12.

Uses—The uses of chromium may be listed under three categories—metallurgical, refractory, and chemical—which normally account for about 47, 37, and 16 percent respectively of the total. Perhaps the best known application, chrome plating on steel, actually uses only insignificant quantities of the metal. Chromium is the most commonly used of all the alloying elements. Increasing quantities are being used in aluminum and copper alloys, but by far the greater portion of the metallurgical chromium is used in steels. More than 30 kinds of stainless steels, with chromium as the chief alloy element, are currently made in the United States. Other chromium steels are low-alloy steels, high-temperature steels, and high-speed tool steels, in which chromium imparts increased hardness, tensile strength, and ductility. Chromium is used in refractories not as a metal but as the mineral chromite, which is used as bricks and cement for metallurgical furnace linings, particularly steel furnaces. Chemical compounds of chromium are used in pigments, tanning, dyes, textiles, and electroplating.

Production—Most of the chromite consumed in this country normally is imported, but during World Wars I and II domestic production increased greatly, only to drop back to negligible amounts after the wars. Very small shipments have been made from deposits in Washington (200 tons prior to 1932), but most of the domestic production comes from southern Oregon and northern California.

Prices—Chromium metal in 1946 was quoted at 89 cents per pound, in 1948 at 93 cents to \$1.03 per pound, and in 1951 at an average of \$1.07 per pound. In March 1953 chromium metal, 97-percent pure, sold at \$1.25 per pound, and 99-percent pure electrolytic metal at from \$3.00 to \$4.50 per pound. Chromite is sold in three grades. Metallurgical grade should contain a minimum of 48 percent Cr_2O_3 , have a chrome-iron ratio of not less than 3 to 1, and have a hard lumpy structure, with pieces ranging from ½ inch to 6 inches in size. Refractory and chemical grades may contain less Cr_2O_3 and have lower chrome-iron ratios. These grades sell for about one-half to two-

thirds the price of metallurgical chromite ores. Chromite rose from \$11.20 per ton in 1915 to a high of \$48.00 in 1918, then dropped back to \$10.28 by 1921. From 1922 through 1939 the price remained very close to \$20.00. During World War II the price rose to a maximum of \$52.80, but by 1948 had dropped to \$25.00 to \$45.00 per ton, depending upon the grade of the ore. Turkish chromite was quoted in March 1953 at \$55.00 per long ton, 48 percent Cr_2O_3 , 3 to 1 chrome-iron ratio, but Rhodesian ore of the same grade was quoted at only \$44.00 per ton, and Rhodesian chromite containing 48 percent Cr_2O_3 but having 2.8 to 1 ratio sold for \$40.00. Domestic chromite delivered to the Grants Pass, Oregon, depot of the General Services Administration was bought by the government in 1953 at \$115 per ton for lump ore and \$110 for fines and concentrates containing 48 percent Cr_2O_3 and having a chrome-iron ratio of 3 to 1.

Ore minerals—The only commercial source of chromium is chromite, FeCr_2O_4 . The pure mineral contains 68 percent Cr_2O_3 , but it is rarely found in nature. Magnesium and aluminum commonly replace part of the iron and chromium, so that commercial chromite ores seldom contain more than 50 percent Cr_2O_3 , and they may contain up to 20 percent each of MgO and Al_2O_3 . Chromium-bearing minerals other than chromite which occur in Washington are the green garnet, uvarovite, $3\text{Ca}\cdot\text{Cr}_2\text{O}_3\cdot 3\text{SiO}_2$, containing 30.6 percent Cr_2O_3 ; the lavender-colored chrome chlorite, kammererite; a chrome-bearing amphibole; and a chrome-bearing clinopyroxene.

Geology—Chromium deposits may be classified as (1) layered, (2) pods, (3) lateritic iron, and (4) placer. The layered deposits are those in which chromite occurs in layers in the lower parts of sheet-like peridotite bodies whose areas commonly are measured in tens of square miles. The chromite layers are from a few inches to several feet thick and from a few hundred feet to several miles long, and they may contain 20 to 22 percent Cr_2O_3 , as at Stillwater, Montana, up to 40 to 45 percent, as in the African deposits. The pod deposits are lenticular masses or individual grains of chromite randomly scattered in peridotite or serpentine. The pods may vary from a few pounds to more than a million tons. There are several deposits of this type in Washington, as well as several lateritic iron deposits which contain up to 3 percent Cr_2O_3 . The lateritic iron deposits form by tropical weathering of serpentine or peridotite and may cover large areas. Chromite occurs as a constituent of black sands, most commonly in beach placers, but few, if any, such deposits have been of high enough grade to be workable at a profit.

OCCURRENCES

The map showing the numbered chromium occurrences is plate 4, on page 13 in volume 2.

CHELAN COUNTY

Blewett (5)

(see under iron)

Davenport

(see Nigger Creek under iron)

Hardcash (1)

(see under nickel)

Keefer Brothers

(see under molybdenum)

Lucky Queen (4)

(see under gold)

Nigger Creek (2)

Loc: SW $\frac{1}{4}$ sec. 12, (22-16E), just E. of the divide between Nigger and Stafford Creeks. **Elev:** 5,800 ft. **Access:** About 4 mi. of trail from the end of Nigger Cr. road. **Prop:** No claim or lease on the property (1943). **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** No ore has been found in place, but several pieces of nearly pure chromite float weighing about 3 lb. each were found in 1942. **Ref:** 67, p. 15.

Nigger Creek (Davenport) (3)

(see under iron)

Washington Nickel

(see Blewett under iron)

CLALLAM COUNTY

Cedar Creek Placer (1)

(see under gold, placer)

Starbuck Placer

(see Cedar Creek Placer under gold, placer)

DOUGLAS COUNTY

Columbia River Placer

(see under gold, placer)

FERRY COUNTY

Danville (1)

Loc: Near center sec. 16, (40-34E), E. of Kettle River. **Elev:** 2,300 ft. **Access:** 2 mi. by road from railroad at Danville. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Disseminated fine grains of chromite in a zone 2 ft. wide and exposed for length of 5 ft. in a roadcut. **Assays:** One sample showed 34.2% Cr₂O₃ and had a Cr/Fe ratio of 2.02. **Ref:** 158.

Gemini (2)

Loc: 11.7 mi. NW. of Nespelem, at Cache Cr. summit. **Elev:** 4,000 ft. **Access:** Road. **Owner:** Gemini Mines, Inc., Wenatchee, Wash. (1940). **Ore:** Chromium, beryllium. **Ore min:** Chromite, uvarovite, beryl. **Ref:** 58, p. 23. 158.

Keller (3)

Loc: Keller dist. **Owner:** M. W. Sumerlin, Keller, Wash. (1953—). **Ore:** Chromium. **Ore min:** Chromite, kammererite. **Ref:** 158.

KING COUNTY

Baring (1)

Loc: N $\frac{1}{2}$ SE $\frac{1}{4}$ sec. 10, (26-10E), 1 $\frac{1}{4}$ mi. S. of Baring. **Owner:** W. R. Anderson (1944). **Ore:** Chromium. **Ref:** 158. 165, sec. II-C, p. 23.

Seattle Placer

(see under gold, placer)

KITITITAS COUNTY

Balfour Guthrie

(see Cle Elum River under iron)

Bean Creek (8)

(see under iron)

Boulder Creek (Burke) (2)

Loc: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, (23-14E), on W. slope of Mt. Hawkins. **Elev:** 3,500 ft. **Access:** $\frac{1}{2}$ mi. by trail from Cle Elum R. road. **Owner:** Frank Bryant, Cle Elum, Wash., had option to buy from the Northern Pacific Railway Co. (1942). **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Small lens mined out during World War I. A few hundred pounds of ore on the dump. Chromite occurs in serpentinized peridotite. **Dev:** Two short adits, some open cuts. **Assays:** About 50% Cr₂O₃. **Prod:** 1 carload of mixed ore from this and the Crowe property in sec. 33. **Ref:** 123, p. 65. 130, p. 62. 158.

Burke

(see Boulder Creek)

Cle Elum River, north deposit (1)

(see under iron)

Cle Elum River, south deposit (4)

(see under iron)

Crowe

(see Mount Hawkins)

Denney (3)

Loc: NE $\frac{1}{4}$ sec. 36, (23-14E), on nose of ridge. **Elev:** 5,200 to 5,500 ft. **Access:** 1 mi. NE. of end of Denney road. 18 mi. by road to railroad at Ronald. **Owner:** Fred Denney, Horton M. Douglas, Chris Ludker, Seattle, Wash. (1942). **Ore:** Chromium, nickel, mercury, gold. **Ore min:** Chromite, reportedly cinnabar. **Gangue:** Peridotite. **Deposit:** Small pods and disseminations of chromite in serpentine. Also on the property is an exposure of "nickel ledge" rock. **Dev:** Open cuts. **Improv:** Cabin (1952). **Ref:** 158.

Devine

(see under iron)

Gallagher Head

(see Mount Hawkins)

Iron Peak (6)

(see under iron)

Kittitas Placer

(see under gold, placer)

Mount Hawkins (Crowe, Gallagher Head, Skipper) (5)

Loc: SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, (23-15E), in Drew Cr. drainage on SE. slope of Mt. Hawkins, near small lake. **Elev:** 6,000 ft. **Access:** 24 mi. by road from railroad at Ronald, 6 mi. of which is steep mountain road. **Prop:** 9 claims: Chrome Compass, Don, Scoup, Last Wagon, Hope, Mary Ann, Homesite, Vision, June. **Owner:** Skipper Chrome Mining Co., Seattle, Wash., leasing from Jack Crowe, Cle Elum, Wash. (1942). Richard Denney

(1920). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Lenses and lumps of chromite, containing 10% to 20% gangue, strung out in a band of shearing in serpentinized peridotite. Largest lens was 6 ft. wide. One lens was 2 ft. wide, 25 ft. long, 7 ft. deep. Ore largely mined out (1943). **Dev:** 100-ft. trench. **Assays:** 15 tons av. 50% Cr₂O₃. **Prod:** 15 tons of ore during World War I. A carload of ore in 1942. **Ref:** 70, 123, p. 65. 130, p. 62. 157, 158.

Red Rock (11)

(see under nickel)

Skipper

(see Mount Hawkins)

Stafford Creek (10)

(see under iron)

Standup Creek (9)

Loc: Sec. 9, (22-16E), on Standup Cr. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** "Nickel ledge" about 25 ft. wide contains a lens of chromite 4 in. in diameter. **Ref:** 158.

Teanaway (7)

(see under iron)

OKANOGAN COUNTY

Blackbird (5)

Loc: SE $\frac{1}{4}$ sec. 11, (39-25E), Nighthawk dist. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Finely disseminated grains in partially serpentinized dunite. **Ref:** 158.

Brown Lake (7)

Loc: Near W. $\frac{1}{4}$ cor. sec. 6, (34-26E). **Access:** Road. **Prop:** Deeded land. **Owner:** Lloyd Austin, Omak, Wash. (1943). **Ore:** Chromium. **Ore min:** Mariposite (?), chrome chlorite (?), chromite, pyrrhotite. **Gangue:** Quartzite, serpentine. **Deposit:** Chromiferous green quartzite several acres in extent is underlain by peridotite. Also a small lens of chromite about 1 $\frac{1}{2}$ ft. long in the serpentine. **Dev:** Open pits. **Assays:** Spectrograph shows 0.6% chromium in the quartzite. **Ref:** 158.

Cabin

(see Stepstone under nickel)

Chopaka (1)

Loc: Near W. $\frac{1}{4}$ cor. sec. 13, (40-24E), near top of Mt. Chopaka. **Elev:** 7,500 ft. **Access:** Trail. **Ore:** Chromium. **Ore min:** Chromite, magnetite. **Gangue:** Olivine, serpentine. **Deposit:** Chromite occurs as disseminated grains and as bands 3 or 4 in. wide in dunite. Chromite is also found as $\frac{1}{8}$ -in. veinlets along a fault in the dunite. Most bands 1 $\frac{1}{2}$ ft. or less in length. **Dev:** 8-ft. shaft. **Assays:** 5% chromite in restricted areas. **Ref:** 70, 141, p. 59. 158.

Defense

(see Little Chopaka)

Dorian (6)

Loc: NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, (35-25E). **Elev:** 2,600 ft. **Access:** 5 mi. by road SE. of old town of Ruby. **Ore:** Chromium. **Ore min:** Mariposite, pyrite. **Deposit:** Sericitic quartzite contains small flakes of mariposite along lamination and fracture planes. **Dev:** Open cuts. **Ref:** 75, p. 36.

Double Eagle

(see Dry Bone under lead)

Dry Bone

(see under lead)

Duke of Windsor

(see Dry Bone under lead)

Funkhauser

(see Johnson Creek)

Johnson Creek (Funkhauser, Omak) (8)

Loc: NE $\frac{1}{4}$ sec. 5, (34-26E), near intersection of Riverside cut-off with the Omak-Conconully highway. **Elev:** 1,750 ft. **Access:** 6 mi. from Omak by road. **Owner:** Chrome Cliff Mining Co., Prosser, Wash. (1955—). Frank Funkhauser, Spokane, Wash. (1951—). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Chromite disseminated sparsely through ultrabasic rock. Near the ultrabasic-dolomite contact is a tabular body of nearly solid chromite 7 $\frac{1}{2}$ ft. by 6 ft. by 3 ft. A small stringer about 2 in. wide and 18 in. long is about 10 ft. N. of the main pod. **Assays:** Chip sample across 5-ft. face of ore showed 26.88% Cr, 12.03% Fe, which gives a Cr/Fe ratio of 2.23. Another 5-ft. channel sample showed 42.85% Cr₂O₃, 10.65% Fe, which gives a Cr/Fe ratio of 2.75. A 5-ft. channel sample in the serpentine showed 11.35% Cr₂O₃. **Prod:** 5.9 tons assaying 42% Cr₂O₃ and having Cr/Fe ratio of 2.9 (1955). **Ref:** 157, 158, 171, pp. 21, 23, 30.

Jumbo (9)

(see also Stepstone under nickel)

Loc: Near center SW $\frac{1}{4}$ sec. 32, (33-31E), Nespelem dist. **Access:** 2.8 mi. up Stepstone Cr. road from Park City road. **Prop:** 1 claim (Jumbo) of the present Stepstone property. **Owner:** Mrs. Mamie Bowman (1943). Silver Creek M. & M. Co. (1915). **Ore:** Chromium, copper, nickel. **Ore min:** Chromite, chalcopyrite, pyrite, fuchsite, genthite. **Gangue:** Quartz. **Deposit:** Series of limestone, serpentine, and argillite cut in places by quartz veinlets. Veinlets and portions of the wall rocks mineralized. **Dev:** Adit and open pit. **Assays:** One 3-in. band of chromite and a 1-ft. band of sheared quartz containing considerable percentage of chromite. **Ref:** 122, p. 85.

Little Chopaka (Defense) (2)

(see also Peerless under copper)

Loc: SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, (40-25E), on Little Chopaka Mtn., Nighthawk dist. **Prop:** 4 claims. Probably part of the Peerless property. **Owner:** William Bridey and L. H. Everett (1941). **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Small peridotite mass in schist is $\frac{1}{8}$ to $\frac{1}{4}$ mi. wide and $\frac{1}{2}$ mi. long. In the mass are small pods of chromite. **Dev:** Open cut. **Assays:** 27.06% Cr₂O₃. **Ref:** 54, p. 25. 158.

Mohawk (11)

(see under zinc)

Okanogan

Loc: Near Okanogan. **Ore:** Chromium, platinum. **Ore min:** Chromite, platinum. **Deposit:** Chromite-bearing serpentine dike. **Assays:** $\frac{1}{4}$ oz. Pt, Os, Ir together per ton reported by C. W. Smith of Oroville. **Ref:** 123, p. 10.

Omak

(see Johnson Creek)

Peerless (3)

(see under copper)

Stepstone (10)

(see under nickel)

Tonasket

Loc: On hill near Tonasket. **Prop:** Partly deeded land and partly open land. **Owner:** Vernon A. Lestrud, Bellingham, Wash. (1944). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Worthington (4)

(see also Peerless under copper)

Loc: NW $\frac{1}{4}$ sec. 22, (40-25E), on S. slope of Little Chopaka Mtn., Nighthawk dist. **Elev:** 1,250 ft. **Access:** 1 mi. by trail and

3½ mi. by road from railroad at Nighthawk. **Prop:** Probably part of the Peerless property. **Owner:** Roy R. Worthington, Omak, Wash. (1951). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Peridotite. **Deposit:** Lower open cut shows an irregular stringer of chromite 1 in. wide. The peridotite near the cuts contains a few grains of disseminated chromite. **Dev:** 2 open cuts about 100 ft. above the river and about 50 ft. apart. **Ref:** 157.

SKAGIT COUNTY

Anacortes (8)

Loc: Near Anacortes. **Ore:** Chromium, platinum. **Ore min:** Chromite, said to contain platinum. **Ref:** 97, 1905, p. 424. 141, p. 103.

Anacortes Placer

(see under gold, placer)

Bellingham (11)

Loc: Secs. 5 and 8, (36-7E). **Elev:** 4,000 to 5,000 ft. **Access:** Trail. **Prop:** 32 claims including the Stein. **Owner:** L. H. Coffield et al. (1943). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Ref:** 70-A.

Cultus Mountain (10)

(see under nickel)

Cypress Lake (1)

Loc: SE¼SE¼NW¼ sec. 29, (36-1E), on N. shore of main lake. **Elev:** 1,000 ft. **Access:** Boat from Anacortes and trail from beach. **Owner:** George B. Smith et al. (1918). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Adit shows only a few disseminated grains of chromite, but an open cut on hill above shows a lens of chromite. **Dev:** 120-ft. caved adit, open cut. **Ref:** 123, p. 64. 130, p. 61. 141, pp. 60, 61.

Devils Mountain

(see Mount Vernon under nickel)

Fidalgo Island

Loc: Beaches of Fidalgo Is. **Elev:** Sea level. **Access:** Roads which traverse most of the shoreline of the island. **Ore:** Chromium, gold. **Ore min:** Chromite, gold. **Deposit:** Chromite beach sands. **Assays:** A few specks of Au with considerable chromite sand can be obtained from a pan. **Ref:** 126, p. 10.

Last Chance (2)

Loc: Sec. 29, (36-1E), a short distance S. of a lake on Cypress Is. **Elev:** 1,300 ft. **Access:** Old road from Strawberry Bay. **Prop:** 1 claim. **Owner:** Cypress Chrome Co. (1918). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Ore bodies made up of chromite grains thickly disseminated in serpentine. **Dev:** 35-ft. adit. **Assays:** About 25% Cr₂O₃. **Prod:** Has produced. **Ref:** 70. 92, p. 175. 123, p. 64. 141, p. 61. 171, pp. 12, 21, 23, 30.

Leader (12)

(see also Three Lakes)

Loc: Secs. 3, 4, (36-7E), near Three Lks. **Access:** 5½ mi. by trail and 20 mi. by road to railroad at Hamilton. **Prop:** 1 claim: Leader. Part of Three Lakes property. **Owner:** Twin Sisters Chrome and Magnesium Corp., Seattle, Wash. (1954—). Alwyn H. Wild had a 15-yr. lease (1940-1955) from Industrial Mining, Inc. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Ore exposed at 3 localities along Three Lakes Cr. Upper deposit is 5½ ft. wide. 30 ft. downstream the zone is 6 ft. wide. 150 ft. farther downstream is the third exposure. Ore is banded and disseminated and is similar to that on the Meadow claim. **Assays:** Appears to be a little higher grade

than the ore on the Meadow claim. **Ref:** 10, pp. 23-26. 70-A. 158.

McMaster (15)

Loc: Near center W½ sec. 10, (36-7E), on Three Lks. Cr. **Access:** Trail. **Prop:** 2 claims: McMaster, Alma. **Owner:** Leased from Industrial Mining, Inc. by Alwyn Wild (1940). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Assays:** Crude ore contains 56.4% Cr₂O₃ and a Cr/Fe ratio of 2.58. **Ref:** 70-A.

Meadow (13)

(see also Three Lakes)

Loc: Secs. 3, 4, (36-7E), near Three Lks. **Access:** 5½ mi. by trail and 20 mi. by road to railroad at Hamilton. **Prop:** 1 claim: Meadow. Part of Three Lakes property. **Owner:** Three Sisters Chrome and Magnesium Corp., Seattle, Wash. (1954—). Alwyn H. Wild had a 15-yr. lease (1940-1955) from Industrial Mining, Inc. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Banded and disseminated ore exposed for 145-ft. width and vertical distance of 50 ft.; and 400 ft. down slope another exposure of disseminated ore is exposed for a distance of 50 ft. and width of 20 to 30 ft. **Assays:** 20 channel samples taken by owner across strike of bands in upper exposure ranged from 4.95% to 25.52% Cr₂O₃. Clean concentrate contains 56.75% Cr₂O₃ and has Cr/Fe ratio of 2.9. An exposed area 170 by 145 ft. av. 9% Cr₂O₃. **Ref:** 70-A. 158.

Mexican Bay

(see Smith)

Mount Vernon (9)

(see under nickel)

Nellie Kelly (3)

Loc: W. of Lk. 1058 on Cypress Is. **Elev:** 1,140 ft. **Access:** 1½ mi. by steep bulldozer road from Strawberry Bay. **Prop:** 1 claim: Nellie Kelly. **Owner:** Ed Kelly and J. M. Wamba. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Knots, stringers, and bunches of chromite in slightly serpentinized dunite. **Dev:** Large adit 40 ft. long and 15 ft. wide. **Assays:** Est. av. 10% Cr₂O₃, but the tonnage is very low. **Ref:** 158.

Olivine Hill (7)

Loc: Near SW. cor. SE¼ sec. 4, (35-1E), a short distance W. of triangulation point, on Cypress Is. **Elev:** At tide level. **Access:** Boat from Anacortes. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Sparsely disseminated grains of chromite in fresh unaltered dunite. **Assays:** Ore runs 0.59% chromite. **Ref:** 158.

P & H

(see Three Lakes)

Pacific

(see Mount Vernon under nickel)

Ready Cash (4)

Loc: On steep W. slope of Cypress Is. about ¾ mi. from shore. NE¼NE¼ sec. 30, (36-1E). **Elev:** 1,100 ft. **Access:** Boat from Anacortes. **Prop:** 1 claim: Ready Cash. **Owner:** Cypress Chrome Co. (1918). **Ore:** Chromium. **Ore min:** Chromite, kotschubeite. **Gangue:** Serpentine, hornblende. **Deposit:** Chromite occurs as irregular veinlets an inch or more thick and as bunches or pockets a foot or more in diameter. The surrounding masses of serpentine contain disseminated chromite. **Dev:** Open cut 36 ft. long, 4 to 6 ft. wide and 10 to 12 ft. deep. Also a 10-ft. adit. **Assays:** Ore av. 47.5% Cr₂O₃. Some ore showed 0.006 to 0.245 oz. Pt per ton. **Prod:** 25 tons in 1917, 50 tons in 1918. **Ref:** 70. 92, p. 175. 123, pp. 63-64. 130, p. 61. 141, pp. 60-61. 171, pp. 12, 17, 21, 23, 30.

Smith (Mexican Bay) (5)

Loc: NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, (36-1E), on steep hillside just W. of Mexican Bay, Cypress Is. **Elev:** 500 ft. **Access:** Boat from Anacortes. **Prop:** 1 claim. **Owner:** George B. Smith et al. (1918). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** Small bunches and stringers of chromite along a fault zone and in serpentine adjacent to the fault. **Dev:** Short caved drifts, open cut. **Assays:** Ore runs 30% chromite. **Ref:** 123, p. 64. 130, p. 61. 141, p. 60.

Smith open cut (6)

Loc: Center SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, (36-1E), N. 4° E. from hill 1262 in sec. 32, E. of main lake, Cypress Is. **Elev:** 1,100 ft. **Access:** Boat from Anacortes. **Owner:** George B. Smith et al. (1918). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine, olivine. **Deposit:** A 1-ft. band of chromite consisting of several stringers of chromite-rich ore $\frac{1}{4}$ to $\frac{1}{2}$ in wide. Band exposed for full length of cut. Exposed to height of 6 ft. **Dev:** 30-ft. open cut. **Assays:** Ore runs 30% Cr₂O₃. **Ref:** 158.

Three Lakes (P & H, Wild) (14)

(see also Leader, Meadow)

Loc: Secs. 3 and 4, (36-7E), in area around Three Lks. **Elev:** 2,500 to 4,000 ft. **Access:** 5 $\frac{1}{2}$ mi. by trail from end of old logging grade. 25 mi. to railroad at Hamilton. **Prop:** 26 claims, including: Shaft, Alamether, Gora, Leader, Meadow, Howard. **Owner:** Twin Sisters Chrome and Magnesium Corp., Seattle, Wash. (1954—). A 15-yr. lease (1940-1955) by Alwyn H. Wild from Industrial Mining, Inc. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** On Leader and Meadow claims is banded and disseminated chromite in a zone up to 145 ft. wide and lenses of pure chromite in dunite. Six chromite lenses from 2 to 8 in. wide occur in a 7 $\frac{1}{2}$ -ft. section of dunite in one place. Other places show lean chromite bands 8 to 16 in. wide. On Alamether claim is a band of disseminated chromite, est. to av. 13% Cr₂O₃, exposed in cliff to width of 80 ft. and height of 100 ft. On Gora claim is a lens, est. to av. 25% Cr₂O₃, from 3 to 30 ft. thick exposed in cliff to height of 300 ft. A band est. to av. 7% Cr₂O₃ is exposed on Shaft claim for less than 20-ft. width and about 300-ft. height. **Dev:** Open cuts, diamond drill holes. **Improv:** Cabin (1951). **Assays:** Crude ore from the Leader had a Cr/Fe ratio of 2.35. Ore from Meadow contained 4.95% to 25.52% Cr₂O₃ and had a Cr/Fe ratio of 2.9. **Ref:** 10, pp. 23-26. 70-A. 157. 158.

Twin Sisters

Loc: Twin Sisters Mtns. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Olivine. **Deposit:** Chromite occurs as pods, bands, and disseminated grains in dunite. Individual pods are small. **Ref:** 130, pp. 61-62. 140, p. 59.

Wild

(see Three Lakes)

SNOHOMISH COUNTY**Florence Rae (2)**

(see under copper)

Mountain Cedar (1)

(see under copper)

Mystery

(see Mountain Cedar under copper)

Paystreak

(see Mountain Cedar under copper)

STEVENS COUNTY**Mally (1)**

(see under iron)

WHATCOM COUNTY**Alaska (31)**

Loc: Near center N $\frac{1}{2}$ sec. 31, (37-7E), in Twin Sisters Mtns. **Elev:** 5,000 ft. **Access:** Trail. **Prop:** 3 claims. **Owner:** L. H. Coffield et al. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Ref:** 158.

Amos 'n Andy

(see Galbraith)

Anne

(see Robert and Anne)

Bates and Kraemer (28)

Loc: Sec. 25, (37-6E), Twin Sisters area. **Prop:** 2 unpatented claims. **Owner:** James W. Ruel, Lake Charles, La. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Boulder Creek (3)

Loc: On Boulder Cr. near Maple Falls. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Chromite float is reported to have been found in Boulder Cr. **Ref:** 158.

Bumper (14)

Loc: Near NE. cor. sec. 13, (37-6E), about 75 ft. S. of Green Cr. and 900 ft. from the foot of the glacier. **Access:** Trail. **Prop:** 1 claim. **Owner:** Mount Baker Chromium Co. (1937). Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Lens of chromite 35 ft. long and 7 to 15 in. thick at its center. Lens consists of about 50% to 60% chromite. Smaller parallel pods and lenses. **Ref:** 158.

Button

Loc: On the headwaters of S. Fk. Nooksack R., in T. 37 N., R. 7 E., Twin Sisters area. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Crater

(see Thunder Mountain)

Cultus

(possibly part of Thunder Mountain property)

Loc: Near a branch of Skookum Cr. at NW. end of Twin Sisters Mtns. **Prop:** 1 claim, part of a group of 6 claims. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Outcrop of disseminated ore is 5 ft. wide, 200 ft. long, and shows in bluff to depth of 30 ft. **Assays:** 18.4% Cr₂O₃. Cr/Fe ratio is 2.78. **Ref:** 158.

Danny (21)

Loc: Approx. in N $\frac{1}{2}$ sec. 19, (37-7E), near head of S. Fk. Nooksack R., Twin Sisters area, in a cliff about 800 ft. above the valley floor. **Elev:** 4,000 ft. **Access:** Trail. **Prop:** 1 claim. **Owner:** Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite, chrome, chlorite, chrome hornblende. **Deposit:** Two lenses of nearly solid chromite separated by 6 in. of dunite. Each lens is about 10 ft. wide and exposed for 10 ft. One lens grades into dunite at a depth of 6 ft. **Dev:** Open cut. **Assays:** Crude ore contains 51.7% Cr₂O₃ and has a Cr/Fe ratio of 3.13. **Prod:** 3,000 lb. of ore were sacked and packed to Bellingham in 1934. **Ref:** 70. 70-A. 171, pp. 11-30.

Dare

Loc: E. slope of Twin Sisters Mtns., on headwaters of S. Fk. Nooksack R., in T. 37 N., R. 6 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Diablo (32)

Loc: Reported near the head of the Thunder Cr. arm of Diablo Lk. Approx. sec. 23, (37-13E). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

E. N. H. (24)

Loc: Sec. 33, (37-7E). **Prop:** 3 unpatented claims. **Owner:** H. H. Hinshaw, Mount Vernon, Wash. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Eight Hundred Kings (9)

Loc: E. slope of Twin Sisters Mtns., on headwaters of Sister Cr., T. 37 N., R. 6 E. **Owner:** R. McArthur et al. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Ford

Loc: E. slope of Twin Sisters Mtns., on headwaters of S. Fk. Nooksack R., T. 37 N., Rs. 6 and 7 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Galbraith (Amos 'n Andy) (17)

Loc: S $\frac{1}{2}$ sec. 8, (37-7E), on knob E. of Hildebrand Lk., Twin Sisters area. **Elev:** 5,000 ft. **Access:** Trail. **Prop:** 4 claims. **Owner:** A. C. Ross et al. (1934). **Ore:** Chromium. **Ore min:** Chromite, chrome chlorite, uvarovite. **Gangue:** Dunite. **Deposit:** Lens of chromite 5 to 6 ft. thick, and 5 to 6 ft. of adjacent country rock containing chromite stringers. Lens is traceable for 6 to 10 ft. **Assays:** Crude ore contains 44.4% Cr₂O₃ and has a Cr/Fe ratio of 2.86. **Ref:** 70-A.

Good Hope (20)

Loc: SW $\frac{1}{4}$ sec. 18, (37-7E), on head of S. Fk. Nooksack R. **Elev:** 3,100 ft. **Access:** Trail. **Prop:** 1 claim. **Owner:** Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Lens of chromite in dunite. Hurst reports two 12-in. stringers and one 18-in. stringer of chromite. **Assays:** Sample assayed in 1933 showed 44.09% Cr₂O₃, 23.15% FeO, 2.95% MgO, 8.60% SiO₂, 11.10% Al₂O₃, and traces of P and S. **Ref:** 70. 70-A. 158. 171, pp. 11, 23.

Government (27)

Loc: NE $\frac{1}{4}$ sec. 24, (37-6E), Twin Sisters area. **Ore:** Chromium. **Ref:** 158.

Grant

Loc: Headwaters of S. Fk. Nooksack R. **Prop:** 4 unpatented claims (1952). **Owner:** A. Grant Franklin, Mount Vernon, Wash. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Hardscrabble

(see Thunder Mountain)

Harrington (10)

Loc: Sec. 34, (38-7E), Twin Sisters area. **Prop:** 4 unpatented claims. **Owner:** Gladys H. Harrington, Yakima, Wash. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Hildebrand (18)

Loc: Adjoining N. side of Hildebrand Lk. on crest of ridge between Green Cr. and S. Fk. Nooksack R. **Prop:** 4 claims. **Owner:** A. C. Ross et al. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Hornet (25)

Loc: Sec. 34, (37-7E), on Granite Cr. **Prop:** 1 unpatented claim. **Owner:** Albert Nielson, Sacramento, Calif. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Joan

Loc: Twin Sisters area. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Jordan

Loc: E. slope of Twin Sisters Mtns, on headwaters of S. Fk. Nooksack R., T. 37 N., R. 6 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

King (11)

Loc: Sec. 35, (38-7E), on Middle Fk. Nooksack R. **Prop:** 14 unpatented claims. **Owner:** J. H. King, Seattle Wash. (1952). **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Kraemer

(see Bates and Kraemer)

Lambert (26)

Loc: Near E. line SE $\frac{1}{4}$ sec. 23, (37-6E), on headwaters of N. Fk. of Hayden Cr. **Elev:** 4,000 ft. **Access:** Trail. 15 mi. from railroad at Saxon. **Prop:** 1 claim; Lambert. **Owner:** Yamate Trading Co., Ltd., San Francisco, Calif. (1952). S. S. Lambert, Sumas, Wash. (1942). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** 2 deposits about 800 ft. apart on opposite sides of the creek. N. deposit has several thousand tons of 50% chromite in banded and disseminated ore zone 240 ft. long, up to 50 ft. wide, and having exposed depth of 50 ft. The S. deposit is similar but smaller and lower grade. **Assays:** One sample of crude ore showed 36.92% Cr₂O₃ and a Cr/Fe ratio of 2.65. Another sample, 16.49% Cr₂O₃ and Cr/Fe ratio of 2.65. **Ref:** 70-A. 158.

Last Notch (22)

Loc: Adjoins the Danny on the E. Approx. in N $\frac{1}{2}$ sec. 19, (37-7E). **Elev:** 4,000 ft. **Access:** Trail. **Prop:** 1 claim. **Owner:** Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Ref:** 70-A. 158.

Lone Pine (8)

Loc: On headwaters of Sister Cr., T. 37 N., R. 6 E. **Owner:** Robert McArthur et al. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

M & M (Sister Creek, McArthur) (6)

Loc: W $\frac{1}{2}$ sec. 1, (37-6E), on headwaters of Sister Cr. **Access:** Trail. **Prop:** 4 claims. **Owner:** Robert McArthur et al. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Lens of chromite several feet long and about 1 ft. wide. Float indicates another body or lens above this lens. **Dev:** Open cut. **Assays:** Two samples from this area assayed 37.4% and 41.1% Cr₂O₃. **Ref:** 70-A. 158.

McArthur

(see M & M)

Nooksack (1)

Loc: W. side of Sumas Mtn., S. of an old iron mine in sec. 35, (40-4E). **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** 2 small chromite stringers. Other outcrops reported in this area are covered by slides. **Dev:** Adit. **Ref:** 171.

Odmark

(see Thunder Mountain)

One Thousand Aces (7)

Loc: On headwaters of Sister Cr., T. 37 N., R. 6 E. **Owner:** Robert McArthur et al. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Opportunity (19)

Loc: SW $\frac{1}{4}$ sec. 18, (37-7E), in basin at head of S. Fk. Nooksack R. **Elev:** 4,000 ft. **Access:** Trail. **Prop:** 1 claim. **Owner:** Washington Chrome Co., Seattle, Wash. (1937). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Zone in

dunite 6 ft. wide and 40 to 50 ft. long contains 10 or 12 discontinuous chromite schlieren, which are composed of 60% chromite and 40% dunite. **Ref:** 158.

Partner

Loc: Headwaters of S. Fk. Nooksack R., T. 37 N., R. 6 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Pat

Loc: E. slope of Twin Sisters Mtns., on headwaters of S. Fk. Nooksack R. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Pinochle (5)

Loc: On headwaters of Sister Cr., T. 37 N., R. 6 E. **Owner:** Robert McArthur et al. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Rainbow

Loc: 9 mi. N. of Hamilton, in Twin Sisters Mtns. **Owner:** Earl and Howard Scott, Sedro Woolley, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Ranger (15)

Loc: Near S. Fk. Nooksock R., sec. 13, (37-6E). **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Ribbon (16)

Loc: N $\frac{1}{2}$ sec. 7, (37-7E), on NW. valley wall of Green Cr. **Elev:** 3,875 ft. **Access:** Trail. **Prop:** 2 claims: Ribbon, Button. **Owner:** Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite, kammererite. **Gangue:** Dunite. **Deposit:** Lenses of chromite in dunite. One lens on Ribbon claim was 20 ft. long and had a max. width of 3 ft. It was mined to a depth of 15 ft. **Dev:** Open cut. **Assays:** Crude ore assayed 51.2% Cr₂O₃ with a Cr/Fe ratio of 3.06. **Prod:** 20 tons of ore from Ribbon claim were sacked and shipped to Bellingham. **Ref:** 70-A. 104, 5/30/33, p. 18; 2/28/37, p. 28. 158. 171, pp. 11-30.

Robert and Anne

(possibly part of Thunder Mountain property)

Loc: Near a branch of Skookum Cr., at NW. end of Twin Sisters Mtns. **Prop:** 2 claims, part of a group of 6 claims. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Chromite stringers 1 to 6 in. wide and 5 to 20 ft. long. **Ref:** 158.

Second Basin (30)

Loc: W $\frac{1}{2}$ sec. 29 and E $\frac{1}{2}$ sec. 30, (37-7E), near divide between Second Basin and Third Basin, Twin Sisters area. **Elev:** 4,300 to 4,500 ft. **Access:** Trail. **Prop:** Group of claims. **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** 3 exposed chromite lodes. **Ref:** 70-A.

Seymour Creek

(see Trappers Pride)

Sister Creek

(see M & M)

Sisters

(possibly part of Thunder Mountain property)

Loc: Near a branch of Skookum Cr., at NW. end of Twin Sisters Mtns. **Prop:** 1 claim, part of a group of 6 claims. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Largest band of solid chromite is 1 to 2 ft. wide and 20 ft. long. Other smaller showings. **Assays:** 44.6% Cr₂O₃. **Ref:** 158.

Skookum

(possibly part of Thunder Mountain property)

Loc: Near a branch of Skookum Cr., at NW. end of Twin Sisters Mtns. **Prop:** 1 claim, part of a group of 6 claims. **Ore:**

Chromium. **Ore min:** Chromite. **Deposit:** Outcrop 80 ft. long is 30 ft. wide at S. end and 10 ft. wide at N end. **Assays:** 25.5% Cr₂O₃. **Ref:** 158.

Stein

(see Sumas Mountain)

Sumas Mountain (Stein) (2)

Loc: Sec. 30, (40-5E), on N. end of Sumas Mtn. One occurrence in center, another said to be in NE $\frac{1}{4}$ of the section. **Elev:** 2,500 ft. **Access:** Trail. **Owner:** Leased for 20 yr. in 1952 to Yamate Trading Co., Ltd., San Francisco, Calif. Nooksack Mining Co. (1949). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Serpentine. **Deposit:** A small stringer of chromite in serpentine exposed in center of the section. Said to be a larger body in the NE $\frac{1}{4}$ of the section. **Dev:** An adit at 2,500 ft. altitude near center SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 30. **Assays:** 38.8% Cr₂O₃ in the ore. Cr/Fe ratio is 2.11. **Ref:** 70. 158. 171, pp. 13-30.

Summer (29)

Loc: NW $\frac{1}{4}$ sec. 31 and S $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 30, (37-7E), Twin Sisters area. **Access:** Trail. **Prop:** 19 claims. **Owner:** John W. Briskey, Mount Vernon, Wash. (1943). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Ref:** 158.

Thunder Mountain (Odmark) (12)

Loc: Near W. $\frac{1}{4}$ cor. sec. 11, (37-6E), on headwaters of Orofino Cr. **Elev:** 5,000 ft. **Access:** Trail. **Prop:** 10 claims including the Hardscrabble and Crater. **Owner:** Albert Odmark (1934). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** Small stringers and streaks of chromite in dunite over an area 50 by 60 ft. in extent. **Assays:** 7 samples of crude ore taken from different places av. 18.2% Cr. **Ref:** 70-A. 158.

Trappers Pride (Seymour Creek) (13)

Loc: SW $\frac{1}{4}$ sec. 2, (37-6E), at head of Seymour Cr., Twin Sisters area. **Elev:** 5,100 ft. **Access:** Trail. **Prop:** 1 claim. **Owner:** L. E. Bradley (1937). **Ore:** Chromium. **Ore min:** Chromite. **Gangue:** Dunite. **Deposit:** 2 parallel stringers of chromite 48 ft. long. Stringers are 1 $\frac{1}{2}$ to 2 in. wide and separated by 4 to 5 in. of dunite. **Ref:** 158.

Warren

(possibly part of Thunder Mountain property)

Loc: Near a branch of Skookum Cr., at NW. end of Twin Sisters Mtns. **Prop:** 1 claim, part of a group of 6 claims. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Several irregular showings of low-grade ore 5 to 10 ft. wide. **Ref:** 158.

Wells Creek (4)

Loc: On Wells Cr. about 8 mi. E. of Glacier. **Access:** Said to be very inaccessible. **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Chromite is reported to have been found on Wells Cr. **Ref:** 158.

Whistler (23)

Loc: Near center sec. 17, (37-7E), on N. side of S. Fk. Nooksack R. **Elev:** 3,200 ft. **Access:** Trail. **Prop:** 1 claim: Whistler. **Owner:** Washington Chrome Co., Seattle, Wash. (1934). **Ore:** Chromium. **Ore min:** Chromite. **Deposit:** Chromite is banded and disseminated in saxonite. **Assays:** Most of the ore is low grade, but one sample of ore showed 52.8% Cr₂O₃ and had a Cr/Fe ratio of 3.06. **Ref:** 70-A. 158.

Willie

Loc: E. slope of Twin Sisters Mtns., T. 37 N., Rs. 6 and 7 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

Zoanne

Loc: E. slope Twin Sisters Mtns., T. 37 N., Rs. 6 and 7 E. **Owner:** Washington Chrome Co., Seattle, Wash. **Ore:** Chromium. **Ore min:** Chromite. **Ref:** 158.

COBALT

Properties—Cobalt is a silver-white metal which has a pinkish tinge. It is tough and has a hardness of 5.5, slightly harder than iron or nickel. It strongly resembles nickel in appearance and properties, especially in its resistance to corrosion. Cobalt is strongly magnetic, being exceeded in this property only by iron, and it retains its magnetism up to 1150° C. Other properties are shown in the table on page 12.

Uses—The most important use (35 percent in 1950) is as alloys with iron for permanent magnets. The second most important use (27 percent in 1950), and formerly the chief use, is as stellite-type alloys containing 45 to 55 percent cobalt, with chromium, molybdenum, tungsten, and iron. These alloys are hard and strong at high temperatures, even at red heat. They are used for facing machine parts subject to high abrasion and for high-speed tools, surgical instruments, jet-engine parts, and other high-heat uses. Cobalt oxide is a necessary ingredient in nearly all porcelain enamel ground coats, although this use formerly accounted for a larger percentage of consumption than now. Cobalt compounds are used in blue pigments, as driers in paints, and as catalysts in the chemical industries. Small amounts of cobalt are used for plating other metals, and an increasing amount is used as a binder in cemented carbides. A new and increasing use for cobalt is in making the radioactive isotope, cobalt 60, a potent radiotherapeutic agent.

Production—Although the United States is the largest consumer of cobalt, domestic production has remained small and sporadic, but planned production from the Blackbird area in Idaho would supply a sizable portion of the current demand in this country. Most of the imported cobalt now comes from the Belgian Congo, where it is recovered as a byproduct from copper ores. All foreseeable needs for cobalt can be supplied for many years by known reserves in the principal deposits, and few small producers can hope to compete. No cobalt ore has been produced in Washington.

Prices—Cobalt compounds were very rare and expensive until the New Caledonian ores came on the market. The price for cobalt oxide remained between \$1.60 and \$2.00 per pound for many years between the 1880's and 1909, when the price jumped to \$2.50, only to drop to \$1.40 in the same year and to continue the decline to as

low as 50 cents in 1912. Cobalt and its compounds remained a drug on the market until after 1915, when increased demand brought a strengthening of the market. Cobalt metal sold for as little as \$1.00 per pound when the Canadian metal came on the market about 1909. By 1915 the metal price was \$1.60. It rose from \$1.25 to \$2.25 in 1917, and from \$2.50 to \$6.00, an all-time high, in 1920. After dropping to about \$3.00 a pound and remaining there from 1921 to 1923, the price declined to \$2.50 and remained near that level through the early 1930's. In 1940 the price for the metal, 97- to 99-percent purity, in kegs of 550 pounds, was \$1.50 per pound, and it remained at that price through 1946, but rose to \$1.65 in 1948, and was \$1.80 in 1949 and 1950. In 1951 the price rose again to \$2.40 per pound and remained there through the early part of 1953. By June 1955 the price was \$2.60 per pound.

Ore minerals—The principal ore minerals of cobalt are the sulfarsenide, cobaltite, CoAsS , containing 35.5 percent cobalt; the arsenide, smaltite, CoAs_2 , containing 28.1 percent cobalt; and the sulfide, linnaeite, Co_3S_4 , containing 55.8 percent cobalt. Smaltite and linnaeite have been found in Washington, as has also the less common sulfarsenide of cobalt and iron, glaucodot, $(\text{Co,Fe})\text{AsS}$. Near Silverton in Snohomish County is an occurrence of the distinctive pink-colored earthy secondary mineral, erythrite (cobalt bloom), $\text{Co}_3\text{As}_2\text{O}_8 \cdot 8\text{H}_2\text{O}$. This hydrous cobalt arsenate is seldom abundant enough to make ore, but it frequently serves to call attention to other less easily recognized cobalt ore minerals.

Geology—Cobalt never occurs native (except in meteorites) and never occurs as the only constituent of an ore. It is very commonly associated with nickel and is found in ores of copper, silver, gold, iron, lead, and zinc. As an arsenide it occurs with nickel in ores that in many places carry high values in silver and gold. As a sulfide cobalt occurs with copper and iron minerals. This type of occurrence is exemplified by the deposits in the Blackbird district in Idaho, which contain 0.4 to 1.0 percent cobalt along with 1 to 2 percent copper, 10 to 15 percent iron, 0.5 to 1.5 percent arsenic, and 3 to 13 percent sulfur. Cobalt ores are found as veins in and near igneous rocks and in residual rocks formed by weathering of basic igneous rocks.

OCCURRENCES

The map showing the numbered cobalt occurrences is plate 5, on page 15 in volume 2.

CHELAN COUNTY

Black Republican
(see under copper)

Blue Jay (2)
(see under copper)

Chelan
(see Dick under nickel)

Dick (6)
(see under nickel)

Keefe Brothers (4)
(see under molybdenum)

King Solomon (1)
(see under copper)

Monarch (18)
(see under gold)

Ontario (16)
(see under gold)

Red Butte (19)
(see under gold)

Red Cloud and Tralee
(see under copper)

Tralee

(see Red Cloud and Tralee under copper)

Winesap

(see Dick under nickel)

FERRY COUNTY

Congress (4)

(see under nickel)

Pin Money (1)

(see under gold)

KITITITAS COUNTY

Bonanza

(see Dolphin under copper)

Dolphin (7)

(see under copper)

LEWIS COUNTY

Eagle Peak (1)

(see under copper)

MASON COUNTY

Black and White (1)

(see under copper)

OKANOGAN COUNTY

Pthomigan (1)

Loc: In T. 38 N., R. 17 E., 1½ mi. from Windy Pass. near W. Fk. Pasayten R. **Owner:** Mrs. L. A. Gourlie, Winthrop Wash. (1951—). **Ore:** Cobalt, copper, gold, silver. **Ore min:** Glauco-dot, chalcopyrite, pyrite, **Ref:** 158.

PEND OREILLE COUNTY

Bromide

(see La Sota under silver)

Fissure

(see under silver)

La Sota (3)

(see under silver)

Silver Crest

(see La Sota under silver)

Sterling (2)

(see under zinc)

SNOHOMISH COUNTY

Asbestos (3)

(see under nickel)

Big Copper (7)

(see under copper)

Feldt (2)

(see under silver)

Hancock (11)

(see under copper)

Little Chief (6)

(see under copper)

Mackinaw (8)

(see under copper)

Non Pareil (13)

(see under copper)

Weden Creek

(see Mackinaw under copper)

Wild Rose (12)

(see under copper)

STEVENS COUNTY

Daisy

(see Daisy-Tempest under silver)

Daisy-Tempest (7)

(see under silver)

Maki (3)

(see under lead)

New England (2)

(see under zinc)

Rainbow

(see under silver)

Silver Crest

(see under silver)

Silver Mountain

(see Daisy-Tempest under silver)

Stone

(see New England under zinc)

Tempest

(see Daisy-Tempest under silver)

COLUMBIUM (NIOBIUM) and TANTALUM

Columbium and tantalum are described together because they usually occur associated in the same ore deposits, many of their properties are similar, and some of their uses are the same. Despite the fact that the name columbium, commonly used in the United States, has more than 40 years' priority, the International Union of Chemistry in 1949 recommended that the name niobium, favored in some other countries, be adopted for this rare element. However, the name columbium is so well established it likely will continue in common use at least in this country.

Properties—Both columbium and tantalum when polished look like platinum but when unpolished are darker and bluer. They both are very ductile, malleable, tough,

and strong. They may be welded, and both are remarkably resistant to corrosion by acids and other chemicals. They commonly have a valence of 5 in their compounds. Tantalum is about equal to mild steel in tensile strength, elasticity, hardness, and thermal conductivity. It has the highest melting point of the metals other than tungsten, and is about twice as heavy as columbium. Other properties are shown in the table on page 12.

Uses—Columbium and tantalum have their most important uses in special steels. They impart high-temperature strength and creep resistance to the low-iron super-duty alloys used for jet-engine parts which are exposed to extreme heat and strain. Both elements are used as additions to ordinary stainless steels to improve ductility

and reduce their tendency to air-harden. Added to austenitic stainless steels they inhibit intergranular corrosion at high temperatures, making the steel more weldable, more ductile, and more easily drawn and spun. Both columbium and tantalum are used as "getters" or gas removers in electronic vacuum tubes, and tantalum is used, in addition, for tube electrodes. Prior to 1928 columbium metal was rare and had no industrial uses; and even now, although more than five times as much columbium as tantalum is used in the United States, columbium has few uses as the pure metal. It has been used a little for jewelry and tableware, but the principal uses are in alloy steels. On the other hand, tantalum metal and its compounds have several interesting uses, some of them unique. For example, tantalum is used in surgery as a substitute for bone, because it is inert, and flesh will cling to it as to no other foreign substance. The first important use for tantalum, later replaced by tungsten, was as electric-light filaments. Later it was used in equipment to rectify alternating to direct current, but in this use it has been partially displaced by other substances. Tantalum metal, because of its corrosion resistance, is used to line tanks, pipes, and other equipment in certain chemical industries. It has had minor use in pen points and surgical and dental instruments, and has been used as electrodes in electro-refining certain metals. Tantalum carbide is extremely hard and has been used for dies and cutting tools, and the oxide is used in making special lens glass and as a catalyst in making synthetic rubber.

Production—Very little columbium or tantalum ore is produced in the United States. The peak World War II production in this country was in 1943 and amounted to 5,777 pounds of columbite and 9,411 pounds of tantalite, as compared to imports in that year of 2,383,050 and 643,080 pounds, respectively. Essentially all the columbium and tantalum ores produced in 1950 were used by two companies, one in Chicago and the other at Niagara Falls, New York. No ore has been produced in Washington.

Prices—Columbium metal remained at \$560 per kilogram (\$250 per pound) for rod and \$500 per kilogram (\$227 per pound) for sheet from 1940 through 1945, and at \$280 per kilogram for rod and \$250 for sheet from 1948 through 1950. In 1946 columbite ore having a columbium-tantalum ratio of 10 to 1 or greater was paid for at the

rate of 55 cents per pound of contained Cb_2O_5 , and in 1955 the government was paying \$3.40 per pound of contained Cb_2O_5 plus Ta_2O_5 in ore containing 50 percent or more of the combined oxides. Tantalum metal sold at \$160 to \$200 per kilogram in 1929, at \$91 in 1931, \$65 to \$73 in 1940, \$100 to \$500 in 1943, and at \$160.60 for rod and \$143.00 for sheet from 1948 to 1953.

Ore minerals—The only important ore minerals of columbium and tantalum, and the only ones occurring in Washington, are those of the isomorphous series which has for its end members the iron columbate, columbite, $\text{Fe}(\text{CbO}_3)_2$, containing 82.7 percent Cb_2O_5 , and the iron tantalate, tantalite, $\text{Fe}(\text{TaO}_3)_2$, containing 86.1 percent Ta_2O_5 . There is an almost complete gradation from one end member to the other, and neither is found pure. In some varieties the iron is largely replaced by manganese, and in many varieties part of the iron is replaced by small amounts of titanium, tin, and tungsten. Struverite, a tantalum-iron-bearing variety of the titanium oxide, rutile, has been found in large deposits in Malaya. Other columbium-tantalum minerals are the columbo-tantalates, microlite, samarskite, and fergusonite. Microlite contains also calcium and fluorine, and samarskite contains also iron, calcium, and uranium, as well as cerium and other rare earths. Fergusonite is one of many rare earth columbo-tantalates, none of which is known to occur in minable quantities.

Geology—Columbium and tantalum are widely distributed but occur in few deposits of commercial importance. Deposits from which their ores have been recovered are limited to pegmatites in granites and to placers derived from them. However, columbium occurs in very small amounts (0.00003 to 0.031 percent) in many rock types as a substitute for titanium in the titanium accessory minerals, the highest concentrations being in alkaline rocks such as nepheline syenites. Bauxites derived from such rocks are enriched in columbium, and Arkansas bauxites have been found to average 0.05 percent columbium. Of the many pegmatite dikes in the world only a few contain columbite-tantalite and fewer yet in recoverable amounts. The most favorable pegmatites seem to be those in which the feldspar is albite, and within the pegmatite bodies the most favorable zones seem to be those rich in beryl and spodumene.

OCCURRENCES

The map showing the numbered columbium and tantalum occurrences is plate 3, on page 11 in volume 2.

OKANOGAN COUNTY

Arnold Peak

(see Horseshoe Basin under molybdenum)

Horseshoe Basin (1)

(see under molybdenum)

MacPherson

(see Horseshoe Basin under molybdenum)

STEVENS COUNTY

Calispell Peak

(see Cannon under uranium)

Cannon (1)

(see under uranium)

Railway Dike

(see Cannon under uranium)

COPPER

Properties—Copper is the only metal that is red in color. It has a bright metallic luster, is soft (hardness = 2.5 to 3), is highly ductile and malleable, and has good though variable tensile strength, depending on the physical condition of the metal. Copper is resistant to corrosion and has excellent heat and electrical conductivity. It has a higher electrical volume conductivity than any metal other than silver, but aluminum has double the electrical mass conductivity of copper. The metal is an excellent reflector of infrared radiation. Chemically, it exhibits valences of 1 and 2. All the soluble copper salts are poisonous. Other properties are shown in the table on page 12.

Uses—Copper is one of the most widely used metals, both in its pure form and as a base for many alloys, as well as in its compounds. Most of its uses depend upon its good conductivity of electricity and heat, and its strength, durability, and easy workability. About one-third of the consumption is for electrical manufacture, with other uses following in approximately this order: electrical wire and cable, automobile parts, building materials, household appliances, ammunition, and others. The shapes most commonly used are wire, sheet, and tube, but much of the metal is cast, especially as alloys. Copper is alloyed with zinc to make brass, with tin to make bronze, gun metal, and bell metal, with aluminum to make aluminum-bronze, with zinc and nickel to make German silver, with nickel, gold, and silver to make coinage metals, and with these and other metals for other special alloys. Beryllium added to copper gives an alloy of great strength and excellent high-temperature characteristics. Copper oxide and salts are used in special paints, as coloring agents in glass and ceramic glazes, and as antiseptics and insecticides.

Production—Copper production is seventh in value among the metals produced in the United States. Domestic production exceeded consumption for many years prior to 1938, (with the exception of 1932 to 1936) and the excess was exported, but each year since 1939 we have imported copper in substantial quantities. Peak United States production was 1,090,818 tons of metal in 1943, but the 1952 production of 928,000 tons was only about 15 percent less than this figure. Yearly production has varied greatly, depending upon general economic conditions. For example, prior to 1942 the peak production was 997,555 tons of copper in the boom year of 1929, but, during the depression year of 1933, only 4 years later, production had dropped by 81 percent to only 190,543 tons.

The first recorded production in Washington was 39,785 pounds of copper in 1894, after which no copper output was recorded for 5 years until 1899. Since that date production has been continuous but quite variable, ranging from a minimum of less than 3 tons of metal in 1932 to a maximum of 9,612 tons in 1940. Total production in the state through 1952 was 105,605 tons, valued at \$32,369,845. In 1950 Washington ranked eighth among the states in production, but 92 percent of the United States total came from the first five states: Arizona, Montana, Utah, Nevada, and Michigan, in that order. The 1952 production

of 4,357 short tons of copper, valued at \$2,108,788, accounted for 14 percent of the value of metallic ore mined in Washington in that year. Of the large copper mines in this country, the Howe Sound mine in Chelan County ranked eighteenth in 1950, and it contributed 98 percent of the copper mined in the state. In 1950 there were 26 copper smelters and refineries operating, of which 1, owned by the American Smelting & Refining Co., is in Washington, at Tacoma.

Prices—In the past half century the trends in the price of copper have generally paralleled those for lead and zinc, but copper prices have maintained a higher level and have fluctuated more widely, averaging about 14 cents per pound. The highest yearly average price since 1897 was reached in 1917 at 29.2 cents, and the lowest was 5.6 cents in 1932. Between these extremes the yearly average price has risen to peaks 11 times, with an equal number of lows, in the period from 1897, when the price was 11.3 cents, to 1953, when the price was 28.6 cents. After government price ceilings were lifted early in 1953 the price rose rapidly, so that by April of that year it was at a high of 30 cents per pound, where it remained through 1954. Early in 1955 the price rose rapidly to 35.7 cents, a price which was exceeded only in 1917 at 37 cents. In September 1955 the price rose to an all-time high of 50 cents per pound.

Ore minerals—Copper occurs native and as a principal constituent of more than 160 minerals in the form of sulfides, oxides, and carbonates, and less commonly as antimonides, arsenates, phosphates, silicates, and sulfates. Of these minerals, about 16 are of commercial importance, and 6 have accounted for most of the copper mined in North America. The important ore minerals are sulfides, of which the most abundant and widely distributed is chalcopyrite, CuFeS_2 , containing 34.5 percent copper. Other sulfides are: bornite, Cu_5FeS_4 , containing 63.3 percent copper; chalcocite, Cu_2S , containing 79.8 percent copper; covellite, CuS , containing 66.4 percent copper; enargite, Cu_3AsS_4 , containing 48.3 percent copper; tetrahedrite, $(\text{Cu,Fe})_{12}\text{Sb}_4\text{S}_{13}$, containing about 52.1 percent copper; and tennantite $(\text{Cu,Fe})_{12}\text{As}_4\text{S}_{13}$, containing about 57.0 percent copper. Some of the more important oxidized copper minerals are: cuprite, Cu_2O , containing 88.8 percent copper; tenorite, CuO , containing 79.8 percent copper; malachite, $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$, containing 57.3 percent copper; azurite, $2\text{CuCO}_3 \cdot (\text{OH})_2$, containing 55.1 percent copper; and chrysocolla, $\text{CuSiO}_3 \cdot 2\text{H}_2\text{O}$, containing 36.0 percent copper. Native copper is the ore mineral in a few deposits, especially in Michigan. All these minerals except enargite and tenorite have been reported in Washington, but by far the commonest here is chalcopyrite.

Geology—Copper is the most abundant of the base metals. Its minerals are numerous and widely though irregularly distributed, and they are associated with many different metals in deposits in various rock types ranging in age from pre-Cambrian to Quaternary. Gangue minerals in the deposits may include quartz, calcite, siderite, barite, rhodochrosite, fluorite, sericite, or tourmaline. The types of deposits in which copper is found include mag-

matic segregations, contact-metamorphic, hydrothermal, and supergene (secondary) enrichment deposits. All the large copper deposits and most of the smaller ones are of hydrothermal origin, and in most of them replacement has been dominant over cavity filling. The ores are genetically related to igneous rocks. The host rocks for the huge, well-known "porphyry copper" deposits of the southwest are in stocklike intrusions of monzonitic porphyries or rocks intruded by them. The ore in the larger

deposits is disseminated and low grade, seldom averaging as much as 1.5 percent copper and in some instances as low as 0.5 percent. Vein deposits are smaller, and to be profitably operated must be of considerably higher grade. Many copper deposits have been leached near the surface and enriched at a moderate depth by descending surface water, but this supergene enrichment has been absent or of only minor importance in the origin of copper deposits in Washington.

OCCURRENCES

The maps showing the numbered copper occurrences are plates 6 and 7, on pages 19 and 21 in volume 2.

CHELAN COUNTY

Arizona (27)

Loc: Sec. 11, (31-18E), between Cascade and Meadow Creeks. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrrhotite. **Assays:** 0.49 oz. Au, 1.4 oz. Ag, 1.92% Cu. **Ref:** 67, p. 31. 114, no. 5, p. 84.

Aurelia Crown

(see Crown Point under molybdenum)

Bald Eagle and Gray Eagle

Loc: On a fork of Jack Cr., a tributary of Icicle Cr. **Owner:** L. A. Parker and H. C. Castlebury (1897). **Ore:** Copper. **Ore min:** Tetrahedrite. **Dev:** 16-ft. drift. **Ref:** 63, p. 66. 67, p. 27.

Big Elephant

(see under gold)

Bismarck (32)

(see under zinc)

Black Republican

Loc: Leavenworth dist. **Ore:** Copper, nickel, cobalt. **Ref:** 43, 1895, p. 184. 67, p. 28. 105, 1895, p. 399. 141, p. 63.

Black Warrior (9)

Loc: NE¼ sec. 32, (35-14E), at upper end of lower Horse-shoe Basin. **Elev:** 4,725 ft. **Access:** Road from Stehekin, 50 mi. by boat to Lakeside, and 4 mi. by road to railroad at Chelan Falls. **Prop:** 3 patented claims: Black Warrior, Blue Devil, Golden Gate; and 3 unpatented claims: Waterfall Nos. 1 and 2, and Campsite. **Owner:** Black Warrior Mining Co., Spokane, Wash. (1946—). Geo. B. Markel, Hazelton, Pa. (1905-1946). **Ore:** Copper, zinc, lead, silver, gold. **Ore min:** Chalcopyrite, sphalerite, galena, pyrite, pyrrhotite, arsenopyrite. **Gangue:** Silicified gneiss. **Deposit:** Sulfide lenses and streaks in a 20- to 30-ft. silicified zone at contact between diabase dike and gneiss. **Dev:** 260-ft. crosscut, 563-ft. drift (1950). **Assays:** Av. of several surface samples from av. width of 3 ft. shows 3.44% Pb, 4.12% Zn, 0.74% Cu, 0.026 oz. Au, 4.67 oz. Ag. Sample across 48 in. of ore at face of drift in 1948 showed 2.01% Cu, 2.10% Zn, 1.01% Pb, 4.80 oz. Ag, 0.02 oz. Au. **Ref:** 63, p. 83. 67, p. 39. 88, pp. 53-54. 133, p. 30. 157. 158.

Black and White (66)

(see under gold)

Blankenship (20)

Loc: Sec. 10, (33-16E), at mouth of Agnes Cr. **Access:** About 12 mi. of road from Stehekin. **Prop:** 7 claims and a millsite. **Owner:** E. O. Blankenship, Stehekin, Wash. (1930). **Ore:** Copper, **Ref:** 67, p. 39.

Blewett

(see Peshastin under gold)

Blinn (55)

(see under gold)

Blue Jay (28)

Loc: S½ sec. 1, (31-18E), on E. bank of Meadow Cr. **Elev:** 2,100 ft. **Access:** About 1 mi. of trail from Lk. Chelan at mouth of Meadow Cr. **Prop:** 8 claims (1933). 2 claims (1947): Starbuck, Lawrence. **Owner:** A. G. Mathers, Chelan, Wash. (1947). Chelan Gold Mining Co. (1897). **Ore:** Copper, gold, silver, cobalt. **Ore min:** Pyrrhotite, chalcopyrite, arsenopyrite. **Gangue:** Kaolin, sericite. **Deposit:** Hydrothermally altered zone in granite gneiss contains disseminated ore minerals and solid lenses of sulfides as much as 2 ft. wide. Pyrrhotite constitutes more than 90% of the ore minerals. **Assays:** Sample across 18 in. of sulfide minerals on the surface assayed 0.16 oz. Au, 1.48 oz. Ag, 4.02% Cu. Sample across 13 in. of massive sulfides in lower adit assayed 0.26 oz. Au, 2.50 oz. Ag, 6.86% Cu. **Ref:** 63, pp. 80-81. 67, p. 31. 104, 11/30/33, p. 16. 106, 11/2/33, p. 4. 114, no. 5, 1909, p. 84. 158.

Blue Jay Extension (33)

Loc: Sec. 12, (31-18E), Meadow Cr. dist. **Prop:** 1 claim. **Owner:** A. G. Mathers, Chelan, Wash. (1947). O. Graham, Anacortes, Wash. (1897). **Ore:** Copper, gold, silver. **Dev:** 30-ft. open cut and adit. **Assays:** \$10 to \$19 in Au, \$5 to \$9.50 in Ag. **Ref:** 63, p. 81. 67, p. 31.

Bryan (42)

Loc: Sec. 9, (30-16E), on Phelps Ridge, Chiwawa dist. **Prop:** 20 claims. Probably part of property held by the Royal Development Co. (1940). **Owner:** Una Mining & Milling Co., Seattle, Wash. (1897). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, native copper. **Ref:** 63, p. 78. 67, p. 22.

Butte

Loc: On Bridge Cr. about 25 mi. from the head of Lk. Chelan, Stehekin dist. **Access:** Road and trail from Stehekin. **Owner:** Butte Gold, Silver, & Copper Mining Co. (1902-1907). **Ore:** Copper, gold, silver. **Deposit:** 2 veins, one of which has a width of 8 ft. **Dev:** 56-ft. adit, 42-ft. adit. **Ref:** 33, 1907, p. 407. 67, p. 39. 88, p. 54.

Caledonia (64)

(see under gold)

Canada (29)

Loc: Sec. 1, (31-18E), Meadow Cr. dist. **Prop:** 1 claim. **Owner:** William Bigger (1897). **Ore:** Copper, gold, silver. **Ref:** 63, p. 81. 67, p. 31.

Chelan

(see Dick under nickel)

Copper King

(see Robischaud under molybdenum)

Copper King (Pickwick)

(see Pickwick)

Crown Point (38)

(see under molybdenum)

Crown Power

(see Crown Point under molybdenum)

Crown Prince and Free Coinage

Loc: Stehekin dist. **Owner:** Messrs. Cook, Clarke, et al., Spokane, Wash. (1897). **Ore:** Copper, gold, silver. **Ore min:** Copper sulfides. **Assays:** 31% Cu, \$4.85 Au, 3 oz. Ag. **Ref:** 63, pp. 83-84. 67, p. 39.

Davenport (4)

Loc: Sec. 29, (35-15E), in upper Horseshoe Basin. **Prop:** May be part of Stimpson property. **Owner:** Horseshoe Basin Mining & Development Co. (1949). Cascade Copper Co. (1907-1908). **Ore:** Copper, silver, lead, gold. **Ore min:** Galena, chalcocopyrite. **Deposit:** Mineralized zone 40 ft. wide. **Dev:** More than 500 ft. of adit. **Assays:** \$69 per ton in lead, copper, silver, and gold in ore shipped. **Prod:** 1 ton prior to 1901. **Ref:** 33, 1907, p. 451; 1908, p. 493. 63, p. 83. 67, p. 38. 68, p. 10. 88, p. 54.

Defender (1)

Loc: NE¼ sec. 28, (35-16E), on Grizzly Cr., Stehekin dist. **Prop:** 3 claims. **Owner:** M. A. Allmandinger, Daniel Devore, and others (1897). **Ore:** Copper, silver, lead. **Ore min:** Galena, chalcocopyrite, pyrite. **Dev:** 20-ft. open cut. **Ref:** 63, p. 84. 67, p. 39.

Diamond Dick

(see Black and White under gold)

Dick (47)

(see under nickel)

Doubtful (13)

(see under lead)

Eagle and Iowa (56)

(see under gold)

Emma Lee

(see under gold)

Esmeralda

(see under gold)

Falls (14)

(see under lead)

Flamingo (17)

Loc: Sec. 9, (34-15E), Stehekin dist. **Owner:** J. M. Scheuy-eaulle et al. (1897). **Ore:** Copper, gold, silver. **Assays:** 8% Cu, \$3 Au, 20 oz. Ag. **Ref:** 63, p. 83. 67, p. 40.

Free Coinage

(see Crown Prince and Free Coinage)

Galena (5)

(see under lead)

Gem (34)

Loc: NW¼ sec. 12, (31-18E), just E. of the Blue Jay property, Meadow Cr. dist. **Prop:** 2 claims. **Owner:** Captain Johnson (1897). **Ore:** Copper, gold, silver. **Assays:** 0.23 oz. Au, 2.0 oz. Ag, 5.47% Cu. **Ref:** 63, p. 81. 67, p. 32. 114, no. 5, 1909, p. 84.

Golden Wedge (67)

(see under gold)

Grace (30)

Loc: SE. cor. sec. 1, (31-18E), on Cascade Cr., Meadow Cr. dist. **Prop:** 6 or 7 claims. **Owner:** John Gray, Chelan, Wash. (1947). **Ore:** Copper, silver, gold. **Ore min:** Pyrrhotite, chalcocopyrite. **Gangue:** Kaolin. **Deposit:** Hydrothermally altered zone in granite gneiss carries strong stringers of sulfide min-

erals as much as 1½ ft. in width. Sulfides are 98% pyrrhotite and 2% chalcocopyrite. **Dev:** 146-ft. adit, 17-ft. open cut, and 13-ft. adit. **Assays:** A sample across 14 in. of a particularly high-grade streak in the lower tunnel assayed 0.12% Cu, 0.20 oz. Ag, tr. Au. **Ref:** 67, p. 32. 114, no. 5, 1909, p. 84. 158.

Grand View (50)

Loc: On E. side of Fourth Cr. about 3 mi. SE. of Mt. Stuart. **Ore:** Copper, gold. **Ore min:** Native copper, cuprite. **Deposit:** Irregular ore body in a zone of sheared serpentine. **Ref:** 67, p. 16. 144, p. 9.

Gray Eagle

(see Bald Eagle and Gray Eagle)

Hidden Treasure (46)

(see under gold)

Holden (Howe Sound, Irene) (40)

Loc: Secs. 18 and 19, (31-17E), and secs. 12 and 13, (31-16E), on Railroad Cr. **Elev:** 3,435 ft. at haulage level. **Access:** Boat from Chelan to Lucerne and 12 mi. of good road from there to mine. **Prop:** 13 patented and 78 unpatented claims. **Owner:** Howe Sound Co., New York, N. Y. (1937 —). J. H. Holden (1892-1896). Chelan Copper Co. (1907). Holden Gold & Copper Co. (1901-1924). Lake Chelan Copper Co. (1925-1932). Britannia Mining & Smelting Co., Ltd. (1928). Chelan Copper Mining Co. (1930-1936). **Ore:** Copper, gold, zinc, silver. **Ore min:** Chalcocopyrite, pyrrhotite, pyrite, sphalerite, galena, magnetite, chalcocite, malachite, native copper, molybdenite, pitchblende (?), scheelite. **Gangue:** Silicified metamorphosed sediments. **Deposit:** Zone of sulfide disseminations 20 to 75 ft. wide has exposed length of 2,500 ft. and depth of 2,500 ft. Ore occurs in a roof pendant of metamorphic rocks cut by granitic dikes. Slight amount of radioactive mineralization in footwall zone in W. end of mine at 1,950- and 2,325-ft. levels. **Dev:** 247,566 ft. of drifts, crosscuts, and raises; 231,922 ft. of core drilling (1951). **Improv:** 2,000-ton flotation mill, modern camp for 450 men, roads, docks, tug, barges, and all necessary facilities (1955). **Assays:** Mill feed av. 1.45% Cu, 0.09 oz. Au, 0.344 oz. Ag, 1.02% Zn in 1940; and 0.78% Cu, 0.044 oz. Au, 0.213 oz. Ag, 0.48% Zn in 1951. Samples from basic dike outside of ore zone assayed 0.2% to 0.46% Ni. Radiometric tests showed 0.19% U₃O₈ equivalent in one sample. **Prod:** 1938-1955. From 1938 to 1951 8,320,497 tons of ore were produced. 1950 production was 5,005 tons Cu, 2,531 tons Zn. 1951 production was 8,543,020 lb. Cu, 5,323,436 lb. Zn, 24,205 oz. Au, 117,437 oz. Ag from 550,530 tons of ore. **Ref:** 1-A, vol. 163, pp. 73-95. 37, p. 16. 63, p. 82. 67, pp. 35-36. 88, pp. 55-56. 93, Ch. III, p. 13. 97, 1929, 1930, 1937-1952. 98, 1920-1926. 104, 1/15/32, p. 29; 12/30/32, p. 24; 6/15/34, p. 29; 6/30/34, p. 23; 11/15/36, p. 27. 105, 1907, p. 41. 108, 11/39, p. 30; 5/40; 6/40. 113, 6/17/37, p. 7. 114, no. 5, 1909. 133, p. 35. 148. 158. 159, p. 137. 175.

Horseshoe Basin (10)

(see under lead)

Howe Sound

(see Holden)

Humbug

(see under lead)

Hummingbird (59)

(see under gold)

Hunter (35)

(see under silver)

Idaho (31)

Loc: Sec. 1, (31-18E), on Meadow Cr. **Elev:** 6,330 ft. **Prop:** 2 claims. **Owner:** Seattle Gold Mining & Development Co.

(1897). **Ore:** Copper, gold, silver. **Ore min:** Sulfides. **Deposit:** Ore is near porphyry dike in granite. **Dev:** 73-ft. adit. **Assays:** 16% Cu, 16 oz. Ag, \$8 to \$16 Au. **Ref:** 63, p. 81. 67, p. 32.

Indiana

(see under lead)

Iowa

(see Eagle and Iowa under gold)

Irene

(see Holden)

Ivanhoe

(see Wilder under gold)

Keefer Brothers (41)

(see under molybdenum)

King Solomon (21)

Loc: SE¼ sec. 36, (32-18E), on Meadow Cr. **Elev:** 5,000 to 5,800 ft. **Access:** Trail from mouth of Meadow Cr. **Prop:** 3 patented claims. **Owner:** John Gray, Chelan, Wash. (1947). **Ore:** Copper, silver, gold, zinc, cobalt. **Ore min:** Pyrrhotite, chalcopyrite, pyrite, sphalerite, arsenopyrite. **Deposit:** Hydrothermally altered zone or zones in granite gneiss 2 to 6 ft. wide. Solid sulfide lenses in the zone are 2 to 8 in. wide and consist mostly of pyrrhotite. **Dev:** 832-ft. adit, 2 caved adits each about 200 ft. long, and a 10-ft. adit. **Assays:** 3 assays across sulfide stringers from 2 of the adits showed tr. Au, 0.60 to 1.80 oz. Ag, 0.49% to 2.58% Cu, and 0.18% to 1.05% Zn. **Ref:** 67, p. 33. 114, no. 5, 1909, p. 82. 158.

King Solomon (Pickwick)

(see Pickwick)

Kingman

(see Galena under lead)

Lake Shyall (19)

Loc: NW¼ sec. 16, (34-15E), on Trapper Lk., Horseshoe Basin area. **Owner:** J. M. Scheueyaulle (1897). **Ore:** Copper, gold, silver. **Ref:** 67, p. 41.

La Rica

(see Peshastin under gold)

Leo

Loc: On Nigger Cr. **Owner:** John and William Lynch (1897). **Ore:** Copper, gold, silver. **Dev:** 60-ft. adit. **Ref:** 63, p. 76.

Little Jap (24)

(see under silver)

Logan (7)

(see under lead)

Lottie S. (18)

Loc: Adjoining the Flamingo prospect, Stehekin dist. **Owner:** J. M. Scheueyaulle et al. (1897). **Ore:** Copper, silver. **Assays:** 9% Cu, 2 oz. Ag. **Ref:** 63, p. 83. 67, p. 41.

Marlin (8)

Loc: Near NE. cor. sec. 36, (35-14E), NE. of Quien Sabe prospect. **Access:** About 3 mi. of trail from Stehekin road. **Prop:** 1 patented claim. **Ore:** Copper, lead, gold. **Ore min:** Pyrite, galena, chalcopyrite. **Gangue:** Quartz. **Deposit:** Quartz vein. **Assays:** \$8 in combined values. **Ref:** 67, pp. 41-42.

Meadow Creek Strike (25)

Loc: SE¼ sec. 2, (31-18E), Meadow Cr. dist. **Prop:** 1 claim. **Owner:** John Gray, Chelan, Wash. (1947). **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite, pyrite, chalcopyrite. **Gangue:** Quartz. **Deposit:** 5-ft. silicified shear zone in granite gneiss contains numerous mineralized quartz stringers ¼ to 2 in. wide.

Dev: 165-ft. adit. **Assays:** A sample at the adit face across a width of 7 ft. assayed 0.84% Cu, 0.04 oz. Au, 0.26 oz. Ag. **Ref:** 67, p. 33. 158.

Meridian (52)

(see under gold)

Minneapolis (2)

(see under gold)

Moscow (22)

Loc: Near E. ¼ cor. sec. 35, (32-18E), ¼ mi. E. of Round Lk., Meadow Cr. dist. **Elev:** 4,300 ft. **Prop:** 1 claim. **Owner:** Chan McClean, Bill Ziegler, and Hugh Courtney (1947). **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite, chalcopyrite, arsenopyrite. **Gangue:** Quartz. **Deposit:** A hydrothermally altered zone in granite gneiss with an av. width of 6 ft. contains seams of sulfides and sulfide-bearing quartz. **Dev:** 20-ft. adit, 10-ft. adit, caved adit (1947). **Assays:** A sample across 52 in. of the zone in the upper adit assayed 0.24 oz. Ag, 0.06% Cu, tr. Au. A 3-in. seam of pyrrhotite assayed 1.01% Cu, 1.22 oz. Ag, 0.06 oz. Au, 0.21% As. **Ref:** 63, p. 81. 67, p. 33. 158.

Mountain Sheik

Loc: On Flat Cr. near Sunset prospect, Stehekin dist. **Owner:** J. M. Scheueyaulle et al. (1897). **Ore:** Copper, silver. **Assays:** 15 oz. Ag, 10% Cu. **Ref:** 63, p. 83. 67, p. 42.

Nebraska (23)

Loc: NW¼ sec. 35, (32-18E), Meadow Cr. dist. **Prop:** 1 claim. **Owner:** L. H. Millard (1897). **Ore:** Copper, gold, silver, lead. **Ore min:** Copper sulfides, galena. **Deposit:** 4- to 8-in. paystreak in mineralized porphyry. **Dev:** 36-ft. adit. **Assays:** \$1.25 in Au, 21 oz. Ag. **Ref:** 63, p. 81. 67, p. 33.

Nelson

(see Pickwick)

New York (58)

(see under gold)

North Pole (53)

(see under gold)

Olympia (60)

(see under gold)

Ontario (54)

(see under gold)

Peshastin (61)

(see under gold)

Phipps (62)

(see under gold)

Phyllis (26)

Loc: NE¼ sec. 2, (31-18E), on Meadow Cr. **Access:** 1½ mi. of trail from mouth of Meadow Cr. **Prop:** 2 claims. **Owner:** John Gray, Lakeside, Wash. (1947). **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite, pyrite, chalcopyrite. **Deposit:** Hydrothermally altered zone in granite gneiss 4 ft. wide. Zone contains scattered pyrite and ¼- to 2-in. mineralized veinlets of quartz. **Dev:** 65-ft. adit. **Assays:** An old assay showed 21% Cu, 6 oz. Ag, and \$6.50 Au. This assay could have been obtained only on a very small picked sample. **Ref:** 63, p. 81. 67, pp. 33-34. 158.

Pickwick (Copper King, King Solomon, Nelson, Van Epps Copper) (48)

Loc: Secs. 9 and 10, (23-15E), in basin at head of Jack Cr., a tributary to Icicle Cr. near its source. **Elev:** 5,316 ft. at open pit. **Access:** 10 mi. by trail and about 18 mi. by road to railroad at Leavenworth or 3½ mi. by trail and 30 mi. by road to railroad at Cle Elum. **Prop:** 7 unpatented claims. **Owner:** S. J. Holden

and associates (1946—) leasing to Phantom Creek Copper, Inc., Tacoma, Wash. (1953—). Pickwick Mining & Development Co. (1897). Vanno Mining Co. (1921). Frank Sontag et al., Wenatchee, Wash. (1942). **Ore:** Copper, gold, silver. **Ore min:** Bornite, chalcopyrite, pyrite, copper carbonate, pyrrhotite. **Gangue:** Decomposed quartz. **Deposit:** Said to be a large ore body possibly 120 ft. wide in peridotite near granite contact. Ore minerals disseminated throughout that portion exposed by the workings. **Dev:** 110-ft. shaft with 175-ft. crosscut and 80-ft. drift on 50-ft. level. 2,500-ft. crosscut, raise from crosscut to shaft. Open pit 50 ft. square. **Assays:** 13 tons shipped showed 4.22% Cu, 1.13 oz. Au. **Prod:** 13 tons 1917. **Ref:** 63, pp. 62, 66. 67, pp. 28, 29. 157. 158.

Quien Sabe (15)

(see under lead)

Rainier (57)

(see under gold)

Red Cap (43)

(see under gold)

Red Cloud and Tralee

Loc: On Ruby Cr., a tributary to Nigger Cr. **Ore:** Copper, gold, nickel, cobalt. **Ref:** 63, p. 77.

Red Hill (44)

(see under gold)

Red Mountain (Royal) (45)

Loc: Secs. 15 and 22, (30-16E), at S. end of Phelps Ridge (Red Mtn.), Chiwawa dist. **Elev:** 2,800 and 3,650 ft. **Access:** Good road. **Prop:** 112 claims, 22 of which are patented. **Owner:** Jessie Smith, Seattle, Wash. (1952—). North Star Mining Co. (1902-1907). Royal Development Co. (1917-1946). **Ore:** Copper, silver, gold. **Ore min:** Pyrrhotite, chalcopyrite, sphalerite, pyrite, galena, arsenopyrite, scheelite. **Gangue:** Chlorite, quartz, calcite, biotite, sericite. **Deposit:** Mineralized breccia zone at contact of gneiss and diorite as much as 250 ft. wide. **Dev:** 700-ft. St. Francis adit, 11,000-ft. Trinity crosscut with several hundred ft. of drifts 850 ft. below St. Francis adit, and connecting raise and 3 intermediate levels. **Improv:** Sawmill and 400-ton mill sold for junk in 1946. **Assays:** Tr. to 1.93% Cu, 0.61 to 5.38 oz. Ag, and a little Au. Company records indicate only 1 or 2 very small areas with more than 1% Cu. One area on Trinity level 20 ft. wide, 100 ft. long av. 0.85% Cu, 1.2 oz. Ag, and another area 2 or 3 times this size av. 0.5% Cu, 0.8 oz. Ag. Only traces of tungsten. **Prod:** 1930, 1935, 10,000 tons 1936, 5,825 tons 1937, 12 tons 1940. **Ref:** 8. 33, 1907, p. 875. 37, pp. 14-15. 67, p. 22. 97, 1929, 1930, 1937, 1938. 98, 1922-1931. 104, 8/15/35, p. 26; 9/15/36, p. 34; 10/30/36, p. 32. 106, no. 1, 1929; 8/4/32. 108, 7/39, p. 22. 113, Apr.-May 1934, p. 15; 8/20/36, p. 6; 1/21/37, p. 7. 136-A. 141, p. 22. 158.

Robischaud (37)

(see under molybdenum)

Rouse (16)

(see under lead)

Royal

(see Red Mountain)

Silver Fiend (49)

(see under lead)

Silver King (36)

Loc: SE¼ sec. 12, (31-18E), on Cascade Cr., Meadow Cr. dist. **Access:** Trail from mouth of creek at Lk. Chelan. **Prop:** 2 claims. **Owner:** Seattle Gold Mining & Development Co. (1897). **Ore:** Copper, gold, lead. **Ore min:** Pyrite, chalcopyrite, galena. **Dev:** 35-ft. adit. **Ref:** 63, p. 81. 67, p. 34.

Silver Trail (39)

Loc: Sec. 8, (31-16E), on Railroad Cr. **Prop:** 36 claims. **Owner:** Chemical Products Association (1925-1926). Aurelia Crown Mines Corp. (1909-1918). Crown Power Molybdenum Co. (1922-1924). **Ore:** Copper, gold, silver, lead, zinc. **Gangue:** Quartz. **Deposit:** 3 kinds of deposits on the property produce copper ore, silver-lead-zinc ore, and gold-bearing quartz. **Assays:** Copper ore ran \$7.40 to \$68.20 per ton, a silver-lead-zinc paystreak gave \$96.81 per ton, and the gold ore ran from \$3 to \$45 per ton. **Prod:** Amount not known. **Ref:** 67, p. 36. 98, 1918-1926. 112, p. 167. 114, no. 5, 1909, p. 68.

Spokane Boy and Girl (11)

Loc: In upper Horseshoe Basin. **Access:** Road from Stehekin and about 1½ mi. of trail. **Prop:** 2 claims. **Owner:** W. E. White, Spokane, Wash. (1938). **Ore:** Copper, gold, silver, lead, zinc. **Ore min:** Chalcopyrite, pyrite, galena, sphalerite. **Gangue:** Quartz. **Deposit:** Heavily mineralized vein 1 to 5 in. wide in gneiss. **Dev:** 2 short adits. **Ref:** 67, p. 43. 158.

Stehekin Mining Co.

Loc: On both sides of Company Cr., Stehekin dist. **Prop:** 7 claims. **Owner:** Stehekin Mining Co. (1897). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite. **Gangue:** Quartz. **Deposit:** Wide zone in schist is thoroughly impregnated with sulfides. **Assays:** \$2 to \$7 Au, 2% to 15% Cu. **Ref:** 63, p. 84. 67, p. 43.

Sunset (65)

(see under gold)

Texas Jack (6)

Loc: Sec. 29, (35-15E), in upper Horseshoe Basin. **Access:** Road from Stehekin and about 2 mi. of trail. **Prop:** 1 claim. **Owner:** Chelan Copper Co. (1901-1918). **Ore:** Copper, silver. **Deposit:** Vein contains a 20-in. paystreak. **Ref:** 33, 1907, p. 473; 1908, p. 519. 67, p. 45. 88, p. 54. 98, 1918, p. 68.

Tiger (Galena)

(see Galena under lead)

Tiger (3)

(see under gold)

Tralee

(see Red Cloud and Tralee)

Twin Falls (12)

Loc: Under the falls of Horseshoe Cr. below the Black Warrior Mining Co. property. **Prop:** 1 claim. **Owner:** Horseshoe Basin Mining and Development Co., Bremerton, Wash. (1949). **Ore:** Copper. **Ref:** 63, p. 83. 67, p. 44.

Van Epps Copper

(see Pickwick)

Velma (51)

(see under mercury)

White Elephant

(see Wilder under gold)

White Star

(see under lead)

Wilder (63)

(see under gold)

Winesap

(see Dick under nickel)

CLALLAM COUNTY

Angeles Star (3)

(see under zinc)

Crescent (2)

(see under manganese)

Deer Park**Loc:** Clallam County. **Owner:** C. B. McDonnell, Port Angeles, Wash. (1941). **Ore:** Copper, silver, gold. **Ref:** 158.**Gregory-Savage**

(see Angeles Star under zinc)

Kathryn (1)**Loc:** S½ sec. 35, (30-11W), and NW¼ sec. 2, (29-11W), near Snyder Ranger Station. **Access:** 3 mi. by road to U. S. 101. **Prop:** 3 unpatented claims. **Owner:** J. C. Krueger, Port Angeles, Wash. (1920-1952). **Ore:** Copper. **Ore min:** Chalcopryrite, malachite. **Gangue:** Red argillaceous limestone in basalt. **Ref:** 158.**Winter**

(see Angeles Star under zinc)

CLARK COUNTY

Silver Star (1)**Loc:** Secs. 14, 15, 22, and 23, (3-4E), on W. slope of Silver Star Mtn. **Elev:** 1,500 ft. **Access:** 9 mi. by road to railroad at Yacolt. **Prop:** 1,040 acres. **Owner:** Silver Star Mining Co., R. DeMott, Portland, Ore. (1930-1953). **Ore:** Copper, gold, silver, lead, zinc, nickel. **Ore min:** Chalcopryrite, pyrite, siderite, sphalerite, galena, magnetite. **Gangue:** Quartz and altered country rock. **Deposit:** Mineralized extrusive rock. About 2 tons of ore on the dump. **Dev:** 125-ft. adit, 227-ft. adit. **Assays:** 0.08 to 0.24 oz. Au, 0.50 to 2.08 oz. Ag, 2.32% Cu, 3.6% to 12.8% Zn, and 0.34% to 0.4% Pb. A 3.8-ft. channel sample showed 0.9% Zn, 0.3% Cu, 0.9 oz. Ag. **Ref:** 111, p. 10. 158.

COWLITZ COUNTY

Green Mountain (1)

(see under gold)

FERRY COUNTY

Abe Lincoln (48)**Loc:** Near N. line SE¼ sec. 26, (30-32E), Keller dist. **Ore:** Copper, lead, zinc, molybdenum. **Ore min:** Pyrite, chalcopryrite, galena, sphalerite, molybdenite. **Deposit:** 6-in. quartz vein in which sulfides are distributed in bands. Seams in wall rock coated with films of molybdenite and pyrite. **Dev:** 40-ft. adit. **Ref:** 122, p. 126.**Addie B (52)****Loc:** Near S. line SE¼ sec. 32, (30-33E), Keller dist. **Elev:** 1,600 ft. **Ore:** Copper, molybdenum, zinc, lead, silver. **Ore min:** Pyrite, chalcopryrite, sphalerite, galena, molybdenite, malachite, azurite. **Gangue:** Quartz, calcite. **Deposit:** Sheared sericitized granite traversed by numerous mineralized quartz veinlets mostly a fraction of an inch wide. **Dev:** 4 adits, inclined shaft, open pits. Longest adit 60 ft. long. **Ref:** 122, p. 123.**Addison (Pacific Mutual) (56)****Loc:** SE¼ sec. 36, (30-33E), SW¼ sec. 31, (30-34E), and NW¼ sec. 6, (29-34E). **Elev:** 2,640 ft. **Access:** 5 mi. NE. of Keller on Silver Cr. road. 35 mi. to railroad at Wilbur. **Prop:** 5 patented claims: Le Roi, Bunker Hill, Federal, Mammoth, Snowstorm; and 5 unpatented claims. **Owner:** Pacific Mutual Silver Lead Co., Spokane, Wash. (1928—). Formerly Addison Copper Co. (1918-1926). **Ore:** Copper, lead, zinc, silver, gold, tungsten. **Ore min:** Galena, chalcopryrite, chalcocite, sphalerite, malachite, azurite, scheelite, wolframite, pyrite, lead carbonate. **Gangue:** Quartz. **Deposit:** 4- to 6-ft. quartz veins inschist. Ore occurs as lenses in 3 veins. One ore shoot is 50 ft. long. Another is 100 ft. **Dev:** About 1,700 ft. included in 20 adits and 6 shafts. **Assays:** 5 channel samples gave tr. to 0.01 oz. Au, 1.4 to 33.8 oz Ag, 0.65% to 3.8% Cu, 2.6% to 19.6% Pb. **Prod:** Small amount of lead, copper, zinc, silver, and gold in 1923. **Ref:** 37, pp. 23-25. 46, pp. 142-143. 69, p. 13. 97, 1923, pp. 411-412; 1924, p. 292. 98, 1920-1926. 104, 8/34; 10/36, p. 27. 106, 3/20; 8/31; 11/32. 108, 1/39, p. 22. 112, 1918, p. 163. 130, p. 91. 141, p. 22. 158.**Advance (40)**

(see under silver)

Albert Hall (26)**Loc:** Sec. 32, (34-36E), Covada dist. **Ore:** Copper. **Ore min:** Copper carbonate. **Gangue:** Quartz, calcite, siderite. **Deposit:** 4-ft. quartz vein contains considerable calcite, some siderite, and a slight wash of copper carbonate. **Dev:** Adit, open cuts. **Ref:** 122, p. 175.**American Granby****Loc:** Curlew dist. **Owner:** Boston-New York Mines (1924-1926). National Lead Silver Mining Co. (1915-1920). **Ore:** Copper, lead, zinc. **Ref:** 98, 1918-1926.**Apollo**

(see California under gold)

Belcher (18)

(see under iron)

Belcher (57)**Loc:** NW¼ sec. 36, (30-33E), ½ mi. N. of Golden Cord mine, Keller dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, magnetite. **Gangue:** Epidote, vesuvianite. **Deposit:** Small body of limy argillite slightly copper stained and largely replaced by epidote, vesuvianite, and magnetite. Chalcopryrite sparsely disseminated. **Dev:** Open cut and shaft. **Assays:** Appears to be low grade. **Ref:** 58, p. 6. 122, p. 134.**Big Lake (25)**

(see under lead)

Blevins

(see Meadow Creek)

Blue Bell-Belcher

(see Belcher under iron)

Blue Bird (49)**Loc:** Near center NE¼ sec. 26, (30-32E), Keller dist. **Ore:** Copper. **Ore min:** Chalcopryrite, chalcocite, chrysocolla. **Gangue:** Quartz. **Deposit:** 2-ft. vein of sheared quartz exposed in an open cut for 8 or 10 ft. Wall rock decomposed granite. **Dev:** Open cut. **Assays:** Mass "evidently contains a high percentage of copper." **Ref:** 122, p. 126.**Blue Mountain**

(see Jennie under gold)

Bodie (66)**Loc:** NW¼ sec. 10, (29-33E), 1 mi. E. of Keller. **Ore:** Copper. **Ore min:** Pyrite, chalcocite, malachite. **Gangue:** Breccia, gouge, quartz. **Deposit:** Ore occurs disseminated in a 10-ft. fault zone in andesite underlain by granite. **Dev:** 150-ft. adit with short crosscut and 25-ft. winze. **Ref:** 122, p. 128.**Boston and New York (13)**

(see under silver)

Brimstone

(see Paul and Brimstone under gold)

Cabin

(see Advance under silver)

California (Apollo) (23)

(see under gold)

California (67)

(see also Consolidated Mines and Smelting Co., Ltd.)

Loc: NW¼ sec. 5, (29-33E), Keller dist. **Elev:** 1,900 ft. **Prop:** Several unpatented claims. Part of Consolidated Mines and Smelting Co., Ltd. property. **Owner:** Consolidated Mines and Smelting Co., Ltd., Wenatchee, Wash. (1950). Central Mining Co. (1915). **Ore:** Copper, silver, molybdenum. **Ore min:** Pyrite, chalcopyrite, molybdenite, chalcocite, malachite, molybdic ocher, powellite. **Gangue:** Quartz. **Deposit:** Numerous sparsely mineralized quartz veinlets in granite. Molybdenite occurs in seams widely scattered in the wall rock. **Dev:** 40-ft. adit (Caledonia), several other short adits and open cuts. **Assays:** Sample representative of several feet of the material exposed in the adit assayed 1% Cu, 2.2 oz. Ag. **Ref:** 122, p. 120. 158.

Campbell (79)

Loc: Near center sec. 30, (29-33E), Keller dist. **Owner:** Dave Campbell (1913). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, chrysocolla. **Gangue:** Epidote, garnet, hornblende. **Deposit:** Slightly mineralized silicified shear zone in schist. **Dev:** 140-ft. crosscut. **Ref:** 122, p. 128.

Clay (50)

Loc: Secs. 25 and 26, (30-32E). **Access:** 7 mi. from Keller by road, and 30 mi. from railroad at Wilbur. **Prop:** 4 claims. **Owner:** Mr. Clay, Inchelium, Wash. (1941). **Ore:** Copper, silver, gold, lead, molybdenum. **Ore min:** Molybdenite, pyrite, chalcopyrite, galena. **Deposit:** Said to be a 4-ft. quartz vein. **Dev:** 1,200 ft. of workings on 3 levels. **Ref:** 28, pp. 102-106. 111, p. 9.

Cold Spring (30)

(see under lead)

Comstock (La Fleur) (2)

(see also Walla Walla)

Loc: Near SE. cor. sec. 7, (40-34E). **Elev:** 2,700 ft. **Access:** 2 mi. W. of the Danville-Curlew highway from a place 2 mi. S. of Danville. **Prop:** 8 patented claims and several fractions. Part of La Fleur group. **Owner:** Morning Star Mining Co. (1943—). La Fleur-St. James Mining Co. (1920-1926). Comstock Mining Co. Gold Cup Mining Co. (1938). **Ore:** Copper, silver, lead, zinc. **Ore min:** Chalcopyrite, bornite, galena, sphalerite, tetrahedrite, chalcocite, covellite, pyrite, magnetite, specularite. **Gangue:** Syenite. **Deposit:** Ore minerals occur as concentrations in a 5-ft. syenite dike in metamorphic rocks. **Dev:** 330-ft. adit, 110-ft. shaft, 35-ft. shaft, shallow prospect pits. **Assays:** 3% to 5% Cu across the face of the dike in the shaft. **Ref:** 42, vol. 14, pp. 403-410. 63, p. 108. 98, 1920-1926. 129, pp. 200-201. 158.

Congress (45)

(see under nickel)

Consolidated Mines and Smelting Co., Ltd.

(see also Iconoclast and California under copper, Advance under gold, and Golden Cord under silver)

Loc: Sec. 5, (29-33E), secs. 35 and 36, (30-33E), secs. 12 and 13, (36-32E), Keller dist. **Access:** Roads. **Prop:** Includes Golden Cord, Advance, Silver Ridge, Iconoclast, California properties. **Owner:** Consolidated Mines and Smelting Co., Ltd., Wenatchee, Wash. (1952—). **Ore:** Copper, silver, gold, molybdenum, lead, zinc. **Deposit:** At main property a mineralized fractured zone in granite shows strong silicification with scattered rhodochrosite and pyrite and seams of chalcopyrite and galena and rarely molybdenite along joints and slips. Zone is

exposed for a 2,500-ft length, 200-ft width, and 700-ft. depth, but for the most part it carries only scattered low values. **Dev:** Several thousand feet of underground workings in many separate adits. **Ref:** 28, pp. 67-71. 97, 1938, p. 566; 1939, p. 618. 108, 10/39, p. 32. 150, p. 29. 158.

Copper Key (19)

Loc: Near SE. cor. sec. 7, (37-34E), Belcher dist. **Elev:** 4,650 ft., 4,900 ft. **Access:** About 14 mi. by road NE. of Republic. **Prop:** 7 patented claims. **Owner:** C. M. Trevitt, Republic, Wash. (1941). Copper Key Mining Co. (1907-1915). **Ore:** Copper, iron, gold, silver. **Ore min:** Pyrite, pyrrhotite, magnetite, chalcopyrite. **Deposit:** Ore minerals occur as replacement bodies in limestone. One body is 100 ft. long, 100 ft. wide, and 25 feet thick. In places the ore bodies consist of nearly pure magnetite. **Dev:** 3 levels, 2 upraises, a winze, and a stope total about 2,500 ft. of underground development, 16 diamond drill holes. **Assays:** Unoxidized ores carry from 0.08 to 0.25 oz. Au, 0.14 to 0.46 oz. Ag, and less than 1% Cu. Iron content about 40%. **Prod:** 3,249 tons of oxidized ore shipped in 1907. 7,000 tons prior to 1940. **Ref:** 7, pp. 173-175. 28, pp. 127-131. 33, 1907, p. 518. 48, p. 5. 97, 1910, p. 603. 114, no. 1, 1907, p. 29; no. 5, 1909, p. 71. 116, no. 2, 1908, p. 24. 130, p. 71. 142, pp. 58-59. 166, pp. 32-33.

Copper Prince

(see under silver)

Cougar (76)

Loc: Near center NE¼ sec. 2, (29-32E), Keller dist. **Elev:** 3,100 ft. **Ore:** Copper, silver, gold, zinc. **Ore min:** Chalcopyrite, pyrite, sphalerite. **Gangue:** Quartz, calcite. **Deposit:** Quartz-calcite vein 3 ft. or more wide along a shear zone in granite and quartz porphyry. **Dev:** 200-ft. adit. **Assays:** Sample of the zone assayed 0.02 oz. Au, 3.46 oz. Ag, 1.8% Cu. **Ref:** 58, p. 17. 122, p. 130.

Cuba

(see Big Lake under lead)

Danville

(see under gold)

Delphai

Loc: Danville dist. **Ore:** Copper. **Prod:** 1916. **Ref:** 97, 1916, p. 611.

Dewey (54)

Loc: NE¼ sec. 5 and NW¼ sec. 4, (29-33E), 1 mi. N. of Keller. **Elev:** 1,600 ft. **Prop:** 4 patented claims. **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite, occasional crystal of galena, chrysocolla, native copper, copper sulfate. **Gangue:** Quartz. **Deposit:** Crushed and sericitized granite traversed by innumerable quartz veinlets in which are small proportions of ore minerals. **Dev:** 125-ft. adit, 60-ft. shaft with 40-ft. crosscut at bottom. **Ref:** 122, pp. 119-120. 163, pp. 79-80.

Dick Creek (80)

Loc: Head of Dick Cr., in SE. cor. (29-33E). **Ore:** Copper. **Ore min:** Malachite. **Gangue:** Quartz. **Deposit:** Fair-size quartz veins mostly barren though some show considerable limonite, scattered grains of pyrite, and a little copper stain. **Ref:** 122, pp. 139-140.

Faithful Surprise

(see Morning Star under gold)

Galena (28)

(see under silver)

Gold Crown

(see under silver)

Gold Cup

Loc: Danville dist. **Ore:** Copper. **Prod:** 1939. **Ref:** 97, 1940, p. 477.

Golden Cord (58)

(see under silver)

Grand Forks

Loc: Danville dist. **Ore:** Copper. **Prod:** 1939. **Ref:** 97, 1940, p. 477.

Gray (60)

(see under silver)

Gwin (29)

(see under silver)

Hall Creek

(see Gwin under silver)

Hall Creek Basin (27)

Loc: Sec. 5, (33-36E), on Hall Cr. **Ore:** Copper. **Ore min:** Malachite stain. **Gangue:** Quartz, siderite, chlorite. **Deposit:** Large composite vein consisting chiefly of barren quartz. Here and there a little green discoloration due in part to copper minerals and in part to chlorite. **Dev:** 40-ft. adit and 40-ft. open cut. **Ref:** 122, p. 175.

Handspike (68)

(see also Walla Walla)

Loc: Near center NE $\frac{1}{4}$ sec. 5, (29-33E), Keller dist. **Elev:** 1,800 ft. **Prop:** 1 claim of Walla Walla group. **Owner:** Walla Walla Copper Mining Co. (1915-1924). **Ore:** Copper, molybdenum. **Ore min:** Pyrite, chalcocopyrite, molybdenite. **Deposit:** 3-ft. lode of sheared altered granite partly replaced by quartz and ore minerals. **Dev:** 150-ft. adit. **Ref:** 98, 1918-1925. 112, p. 209. 122, p. 118.

Handy Andy (64)

Loc: NE $\frac{1}{4}$ sec. 1, (29-33E), $\frac{1}{2}$ mi. SW. of Summit prospect. **Ore:** Copper. **Ore min:** Chalcocopyrite, pyrite. **Gangue:** Quartz. **Deposit:** Lode 6 to 18 in. wide in schist. Lode composed of closely spaced quartz veinlets separated by schist sparsely mineralized. **Dev:** 200-ft. crosscut, inclined shaft said to be 85 ft. deep, and some open pits. **Ref:** 122, p. 132.

Hawkeye (17)

(see under gold)

Hercules (5)

Loc: Near center sec. 9, (40-34E). **Elev:** 1,800 ft. **Access:** 1 mi. S. of Danville by road. **Ore:** Copper. **Ore min:** Pyrite, chalcocopyrite. **Gangue:** Quartz, calcite, siderite. **Deposit:** A number of irregular veinlets in serpentine. Some dioritic rock occurs close by. **Ref:** 7, p. 200.

Humboldt (69)

Loc: NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 5, (29-33E), $1\frac{1}{2}$ mi. above Keller. **Prop:** Several claims. **Ore:** Copper, lead, zinc. **Ore min:** Sphalerite, galena, pyrite, chalcocopyrite, rhodochrosite, malachite. **Gangue:** Quartz porphyry. **Deposit:** Granite cut by quartz porphyry dike. Several fractures in the porphyry along a zone 15 ft. wide contain lenticular bunches of ore from 1 to 6 in. wide. **Dev:** 360-ft. adit, open cuts. **Ref:** 46, p. 151. 58, p. 31. 122, pp. 122-123.

Iconoclast (70)

(see also Consolidated Mines and Smelting Co., Ltd.)

Loc: Near center NE $\frac{1}{4}$ sec. 6, (29-33E). **Elev:** 2,450 ft. **Access:** $1\frac{3}{4}$ mi. NW. of Keller by road. **Prop:** Several unpatented claims. Part of Consolidated Mines and Smelting Co., Ltd. property. **Owner:** Consolidated Mines and Smelting Co.,

Ltd., Wenatchee, Wash. (1940—). Iconoclast Gold & Copper Mining Co. (1902). Iconoclast Consolidated Mines Co. (1908-1918). Tenas Mining Co. (1918-1926). **Ore:** Copper, silver, gold, molybdenum. **Ore min:** Pyrite, chalcocopyrite, molybdenite, malachite. **Deposit:** A zone of severely sheared, crushed, bleached, and sericitized granite contains a network of minute mineralized quartz veinlets. Surface indications are that the zone is 150 ft. wide and $\frac{1}{4}$ mi. long. **Dev:** 250-ft. adit from which a 50-ft. drift and 125-ft. crosscut have been driven. **Assays:** Low-grade ore. Richest portions contain est. 5% pyrite and chalcocopyrite together. Sample taken across 60-ft. outcrop assayed tr. Au, 0.4 oz. Ag. **Ref:** 122, pp. 120-121. 158.

Illinois (Oregon) (71)

Loc: SW $\frac{1}{4}$ sec. 5, (29-33E), $\frac{1}{2}$ mi. S. of the California group, Keller dist. **Elev:** 2,100 ft. **Prop:** Several claims. **Owner:** Illinois Copper & Silver Mining & Milling Co. (1915-1926). Illinois Mining & Milling Co. (1908). **Ore:** Copper, molybdenum, zinc, lead, gold, silver. **Ore min:** Pyrite, chalcocopyrite, molybdenite, galena, sphalerite. **Gangue:** Quartz, calcite. **Deposit:** Irregular veins and bunches of mineralized quartz in granite and schist. Also sparsely disseminated ore minerals. **Dev:** 500-ft. adit. **Assays:** Body as a whole is low grade. **Ref:** 33, 1908, p. 804. 58, p. 32. 98, 1918-1926. 112, p. 183. 116, no. 4, 1908, p. 91; no. 5, 1908, p. 117. 122, pp. 121-122.

Iron Creek

(see Shamrock under nickel)

Java

(see Sunflower)

Jennie (10)

(see under gold)

Johnny Boy (31)

Loc: SW $\frac{1}{4}$ sec. 31, (32-37E), Covada dist. **Ore:** Copper. **Ore min:** Chalcocopyrite, pyrite. **Deposit:** Many small quartz veins in argillite show a little pyrite and chalcocopyrite. **Dev:** Explored to "moderate depths." **Ref:** 122, p. 167.

Josie (47)

Loc: E $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 25, (30-32E), Keller dist. **Prop:** 1 claim: Josie. **Ore:** Copper. **Ore min:** Pyrite, chalcocopyrite, specularite. **Deposit:** Shear zone in granite silicified and mineralized. **Dev:** Small pit. **Ref:** 122, p. 126.

Jumper (72)

(see also Walla Walla)

Loc: Near center NE $\frac{1}{4}$ sec. 5, (29-33E), 700 ft. NW. of Handspike, Keller dist. **Elev:** 2,000 ft. **Prop:** 1 claim of Walla Walla group. **Owner:** Walla Walla Copper Mining Co. (1915-1924). **Ore:** Copper, silver, zinc, molybdenum. **Ore min:** Chalcocopyrite, pyrite, sphalerite, molybdenite, malachite, copper sulfate. **Deposit:** A 3-ft. lode composed largely of altered granite, but quartz veinlets containing finely divided sulfides are numerous and closely spaced. **Dev:** Open cut. **Assays:** A lenticular mass 6 in. wide from footwall of the lode assayed 7.5% Cu. and 11.4 oz. Ag. Test sample of 1 ton of ore is said to have yielded \$39 in Cu and Ag. **Ref:** 98, 1918-1925. 112, p. 209. 122, pp. 118-119.

Kelly Camp (14)

(see under tungsten)

Keystone (39)

(see under silver)

King Richard

(see Meadow Creek)

Kohler (24)

Loc: NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1 and NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, (34-36E), Covada dist. **Elev:** 1,600 ft. **Access:** Paved county road crosses the property. **Prop:** 80 acres of deeded land. **Owner:** Joseph A. Kohler, Impach, Wash. (1949). **Ore:** Copper, antimony. **Ore min:** Tetrahedrite, malachite, azurite, pyrite. **Deposit:** Quartz lenses and stringers with max. thickness of 14 in. exposed for 200 ft. in a limestone bed in the Covada series. **Dev:** 3 small open cuts. **Ref:** 158.

La Fleur

(see Comstock, Walla Walla)

Lancaster (11)

(probably known by an older name also)

Loc: Secs. 5 and 6, (39-34E), 1 mi. N. of Curlew, on E. bank of Kettle R. **Elev:** 1,800 to 2,800 ft. **Access:** Railroad within 700 ft. of portal of main adit. Road to Curlew. **Prop:** 4 claims. **Owner:** Elmer Lancaster, Curlew, Wash., leasing to Ed Kirk and C. D. George, Wallace, Idaho (1943). **Ore:** Copper, lead, zinc, gold, silver. **Deposit:** Chimney-like zones 0 to 3 ft. thick at intersection of fractures in limestone at contact with granite. **Dev:** Main adit 1,490 ft. long with 100 ft. of drifts. Several open cuts and shallow shafts. **Prod:** Carload of 30 tons of hand-sorted ore shipped in 1929 from open cuts assayed 28% Cu, 12% Pb, 13.4 oz. Ag, 0.01 oz. Au. **Ref:** 157. 158.

Last Chance (77)

Loc: Near center sec. 2, (29-32E). **Elev:** 3,000 ft. **Access:** 5 mi. by road from Keller. **Prop:** 2 claims. **Owner:** Bert Summerlin, Keller, Wash. (1943). W. M. Boles, Keller, Wash. (1941). **Ore:** Copper, silver, gold. **Ore min:** Chalcopryrite, pyrite, rhodochrosite. **Gangue:** Calcite. **Deposit:** Roof pendant of schist in granite 65 ft. wide moderately sheared, crushed, and recemented. Sparsely impregnated with ore minerals. **Dev:** 86-ft. upper crosscut with 25-ft. drift, 110-ft. crosscut 100 ft. lower than the upper level. **Assays:** Typical assay said to be 1.4% Cu, 1.2 oz. Ag, tr. Au. **Ref:** 28, pp. 42-46. 122, p. 130.

Laurier

(see Talisman)

Lone Star and Washington (1)

Loc: NW $\frac{1}{4}$ sec. 2, (40-33E), adjacent to international boundary. **Elev:** 3,500 ft. **Access:** 7 to 9 mi. by road W. of railroad at Danville. **Prop:** 8 claims. **Owner:** Attwood Copper Mines, Ltd., Vancouver, B. C. (1953—). Reservation Mining & Milling Co. (1897). British Columbia Copper Co., Ltd. (1908-1918). St. Eugene Mining Co. (1952). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite, pyrrhotite, chalcocite, malachite. **Gangue:** Quartz, dolomite, calcite. **Deposit:** Chalcopryrite disseminated and in veinlets along foliation of schistose serpentized dacite in zone 50 ft. wide in hanging wall of diabase dike dipping 30 to 50 degrees to the E. and SE. Company records indicated nearly 250,000 tons of ore containing 1.94% Cu, 0.047 oz. Au, 0.204 oz. Ag remained in the ground. **Dev:** 2,500 ft. of drifts, crosscuts, inclines, winzes, and other workings on the Lone Star; less than 700 ft. on the Washington. 3,590 ft. of diamond drill holes. **Assays:** 36,000 tons shipped had av. of 2.6% Cu, 0.032 oz. Au, 0.193 oz. Ag. **Prod:** 1897 (1,700 tons), 1910-1917 (36,000 tons). **Ref:** 7, pp. 197-199. 33, 1908, p. 413. 63, pp. 108-109. 97, 1908, 1911-1917. 157.

Longstreet (41)

(see under silver)

Lucile Dreyfus

(see Morning Star under gold)

Malachite (59)

(see under silver)

Manila (78)

Loc: SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, (29-32E), adjoining Last Chance property. **Elev:** 2,675 ft. to 2,825 ft. **Access:** 7 mi. by road W. of Keller. **Owner:** Mrs. James Le Favre, Spokane, Wash. (1942). Keller & Indiana Consolidated Smelting Co. (1907-1918). Manila Mining & Milling Co. (1915-1924). **Ore:** Copper, silver, gold. **Ore min:** Pyrite, chalcopryrite. **Deposit:** Roof pendants of schist in granite contain sparingly disseminated pyrite and chalcopryrite. These minerals are still more sparsely disseminated in parts of the granite. **Dev:** On 2 levels: upper, 200-ft. crosscut; lower, 700 ft. of drifts and crosscuts, 30-ft. raise, and 50-ft. winze from upper level. 145 ft. between the 2 levels. 604 ft. diamond drill holes. **Assays:** Cu probably less than 1.5%, also tr. Au, 0.5 to 4 oz. Ag. **Prod:** 1,500 tons produced but not smelted (1900's). **Ref:** 7, pp. 185-186. 33, 1907, p. 714; 1908, pp. 837-838. 98, 1918-1925. 112, p. 190. 114, no. 5, 1909, p. 71. 122, pp. 128-130.

Mascot (3)

Loc: Within 1 $\frac{1}{2}$ mi. of the La Fleur property, Danville dist. **Ore:** Copper. **Ref:** 63, p. 109.

Meadow Creek (King Richard, Blevins, San Poil Monitor) (51)

(probably the same property as Mount Tolman)

Loc: Secs. 25 and 26, (30-32E). **Access:** 30 mi. by road from railroad at Wilbur. **Prop:** 15 claims. **Owner:** Meadow Creek Mining Co., Spokane, Wash. (1949-1951). Explorers, Inc. (1930). **Ore:** Copper, silver, gold, molybdenum, lead, zinc. **Ore min:** Chalcopryrite, chalcocite, molybdenite, pyrite, sphalerite, galena. **Deposit:** Moderately sheared, crushed, and sericitized granite cut by quartz veins and stringers containing sulfides. Sulfides most abundant along footwall. Sulfides sparsely disseminated in granite. **Dev:** 8 adits total 2,103 ft. **Assays:** A sample of the footwall portion of the vein assayed 5% Pb, 4.05% Cu, 27.12 oz. Ag, and small percentage Zn. A grab sample from a large mineralized zone in Pearl adit gave tr. Au, 0.18 oz. Ag, 0.05% Cu, 0.02% Mo. **Ref:** 69, p. 12. 122, pp. 125-126. 133-B, pp. 26-28. 157. 158.

Meteor (37)

(see under silver)

Midnight

(see under silver)

Mineral Hill

(see Morning Star under gold)

Minnehaha (7)

Loc: SE. cor. sec. 23, (40-34E), Danville dist. **Owner:** Boston Consolidated Mining Co. (1908). Mineral Hill Tunnel & Copper Mining Co. (1908). Minnehaha Copper-Gold Mining Co. (1907). **Ore:** Copper. **Prod:** 1903, 1924. **Ref:** 33, 1908, p. 950. 97, 1924, p. 292. 98, 1907, p. 800. 112, p. 191.

Morning Star (6)

(see under gold)

Mount Tolman (53)

(see also Meadow Creek)

Loc: Sec. 31, (30-33E), about 4 mi. NW. of Keller. **Prop:** 39 claims. **Owner:** Mount Tolman Gold Co. (1936). **Ore:** Copper, gold, silver, molybdenum. **Prod:** Operating in 1935, 1936. **Ref:** 104, 11/35, p. 26.

Muldoon

(see under gold)

Nez Perce (43)

(see under lead)

Nez Perce Creek (44)

Loc: SE¼ sec. 20, (31-36E), on Nez Perce Cr. **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Deposit:** 5-ft. quartz vein containing sparsely distributed ore minerals. **Dev:** Pit. **Ref:** 122, p. 176.

Number Seven

(see under silver)

Oregon

(see Illinois)

Oversight (20)

(see under iron)

Pacific Mutual

(see Addison)

Panama (12)

(see under gold)

Patterson

(see Jennie under gold)

Paul and Brimstone

(see under gold)

Pin Money (21)

(see under gold)

Polepick (73)

Loc: NW¼ sec. 5, (29-33E), 1 mi. N. of Keller on E. side of the ridge W. of Sanpoil R. **Elev:** 1,660 ft. **Ore:** Copper, zinc, lead, silver. **Ore min:** Chalcopyrite, sphalerite, galena, subordinate pyrite, and a little tetrahedrite. Molybdenite in some fractures of the granite. **Deposit:** Quartz veins along the contact of granite and porphyry. Veins have total width of several feet and are sparsely mineralized. **Dev:** 700 ft. of workings on one level and some surface cuts. **Prod:** No large shipments reported. **Ref:** 7, pp. 186-187.

Poor Man's Hope (65)

(see under lead)

Quilp (22)

(see under gold)

Railroad (9)

Loc: Sec. 27, (40-36E), Orient dist. **Owner:** Summit Gold & Copper Mining Co. (1908-1909). **Ore:** Copper, gold. **Dev:** 147-ft. incline shaft. **Ref:** 33, 1908, p. 1281. 114, no. 5, 1909, p. 62. 116, no. 5, 1908, p. 117.

Robert E. Lee (42)

(see under antimony)

Rosario (32)

Loc: Near NW. cor. sec. 31, (32-37E), 1 mi. NE. of Covada post office. **Prop:** 1 claim. **Owner:** George Terpening (1912). **Ore:** Copper. **Ore min:** Pyrite, tennantite or tetrahedrite, molybdenite. **Deposit:** Small quartz veinlets in silicified granodiorite. Ore minerals sparsely distributed. **Dev:** 300-ft. adit, short adit, some open pits. **Ref:** 122, p. 169. 163, p. 81.

San Poil Monarch

Loc: Keller dist. **Owner:** Explorers Prospecting Co. (1931). **Ore:** Copper. **Ref:** 106, 4/16/31; 9/17/31, p. 4.

San Poil Monitor

(see Meadow Creek)

Several (35)

(see under lead)

Shamrock (46)

(see under nickel)

Shonee

Loc: Danville dist. **Owner:** Shonee Mining & Milling Co. (1911). **Ore:** Copper, gold, silver. **Prod:** 1911. **Ref:** 97, 1911, p. 785.

Silver Bell (33)

(see under lead)

Silver Hill (61)

Loc: Sec. 6, (29-34E), Keller dist. **Ore:** Copper, silver, gold. **Ref:** 114, no. 5, 1909, p. 69.

Silver King (62)

(see under silver)

Silver Leaf (34)

(see under silver)

Silver Pick

(see under silver)

Skeffington

Loc: Danville dist. **Owner:** Cyprus Mining Co. (1924-1926). **Ore:** Copper. **Ref:** 98, 1925, p. 1813; 1926, p. 1577. 112, p. 175.

Stray Dog (36)

(see under silver)

Summit (63)

(see under zinc)

Sunflower (Java) (38)

Loc: Near S. line sec. 33, (32-36E), 2½ mi. W. of Covada. **Owner:** Syndicate Mining Co. (1915). **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Deposit:** 3½-ft. vein of quartz in schist, argillite, and quartzite. Vein mostly barren but in places slightly mineralized. **Dev:** 450-ft. adit. **Ref:** 122, p. 156.

Talisman (Laurier) (8)

Loc: Sec. 4, (40-36E), on E. slopes of Owl Mtn., 1 mi. S. of international border. **Elev:** 3,400 to 3,600 ft. **Access:** Road and railroad to mill. Tram to mine. **Prop:** 8 unpatented claims. **Owner:** Frank Eichelberger et al., Spokane, Wash., subleasing (1951-1952) from Talisman Mining & Leasing Co., Spokane, Wash., which is leasing (1945-1951) from Glen L. Brink, Charles Moomaw (1915-1952). Laurier Mining Co. (1915-1926). **Ore:** Copper, zinc, silver, lead, tungsten, cadmium, bismuth. **Ore min:** Chalcopyrite, sphalerite, galena, scheelite, pyrite, magnetite. **Gangue:** Shist, epidote, garnet, zoisite. **Deposit:** Low-dipping contact metamorphic deposit in schist. Ore body is 1 to 12 ft. thick. **Dev:** 2,000 ft. of shafts, crosscuts, and drifts. **Improv:** Camp buildings, 75-ton flotation mill, tram (1952). **Assays:** 12 cars totaling 521 tons shipped during World War I gave a net smelter return of \$21 per ton, and av. of 5% Cu, 3 oz. Ag, 4.1% Zn. One ore shoot in 1948 av. 20% Pb, 11% Zn, 2.4 oz. Ag. **Prod:** 1915, \$15,000; 1916, \$36,000; 1946; 1947; 1948, 54 tons conc.; 1949, 37 tons conc.; 1950, 18 tons Zn conc. **Ref:** 7, pp. 201-202. 97, 1917, p. 501; 1919, p. 492. 98, 1918-1926. 106, nos. 7, 12, 1919. 110, 7/48, p. 7. 112, p. 188. 133, p. 40. 157. 158.

Teddy

(see Zipp and Teddy)

Umatilla (74)

(see also Walla Walla)

Loc: Near W. line NE¼ sec. 5, (29-33E), Keller dist. **Elev:** 1,750 ft. **Prop:** 1 claim of Walla Walla group. **Owner:** Walla Walla Copper Mining Co. (1915-1924). Central Mining Co. (1915). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Innumerable quartz veinlets sparsely mineralized occur in greatly sheared sericitized granite. **Dev:** 350-ft. adit, incline. **Assays:** Sample from crosscut at bottom of incline

representing a width of 14 ft. assayed 2.75% Cu, \$2 Au, \$3 Ag. **Ref:** 98, 1918-1925. 112, p. 209. 122, p. 119.

Veda W.

(see under silver)

Virginia

(see Morning Star under gold)

Walla Walla (La Fleur) (4)

(see also Comstock)

Loc: Near SE. cor. sec. 7, (40-34E), 2 mi. W. of the Danville-Curlew highway from a place 2 mi. S. of Danville. **Prop:** 1 claim of the La Fleur group. **Owner:** Charles Rogers, Curlew, Wash. (1954—). La Fleur Mountain Copper Co. (1921). La Fleur-St. James Mining Co. (1920-1926). Morning Star Mining Co., lessee (1943). **Ore:** Copper, gold, silver, platinum. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Feldspar, sericite. **Deposit:** Ledge composed largely of feldspars which have partially altered to sericite. Ore minerals occur peppered and banded through the ledge. **Dev:** 35-ft. shaft. **Assays:** Several assay certificates report the presence of considerable platinum. **Ref:** 98, 1920-1926. 114, no. 5, 1909. 129, pp. 201-202.

Walla Walla (75)

(see also Handspike, Jumper, Umatilla)

Loc: NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 5, (29-33E), Keller dist. **Elev:** 1,700 ft. **Prop:** 1 of several claims in Walla Walla group. **Owner:** Walla Walla Copper Mining Co. (1915-1924). **Ore:** Copper, lead, zinc, molybdenum, gold. **Ore min:** Pyrite, chalcopyrite, sphalerite, galena, molybdenite. **Gangue:** Quartz, sericite. **Deposit:** Sheared sericitized granite sparsely mineralized, and mineralized quartz veinlets which have been severely crushed. **Dev:** 635-ft. adit from which a 75-ft. crosscut has been driven. (Known as Surprise adit.) **Ref:** 98, 1918-1925. 112, p. 209. 122, pp. 117-118.

Washington

(see Lone Star and Washington)

Welcome

(see Boston & New York under silver)

Willmot

Loc: Keller dist. **Owner:** Lorraine Copper Mining Co. (1907-1908). **Ore:** Copper, silver, gold. **Ref:** 33, 1907, p. 752; 1908, p. 888.

Winnipeg (16)

(see under gold)

Yaki

(see Winnepeg under gold)

Zalla M (15)

(see under silver)

Zipp and Teddy (55)

Loc: Near S. line SW $\frac{1}{4}$ sec. 3, (29-33E). **Prop:** 2 patented claims: Zipp, Teddy. **Owner:** Zipp Consolidated Mining & Milling Co. (1901). **Ore:** Copper. **Deposit:** Fault breccia with trend, structure, and composition similar to that of the Bodie, and is probably on a continuation of the same fracture. **Dev:** Shaft, adit. **Ref:** 122, p. 128. 158.

JEFFERSON COUNTY

Big West

Loc: Jefferson County. **Ore:** Copper. **Ref:** 158.

Elwha

Loc: Jefferson County. **Ore:** Copper. **Ref:** 158.

Tubal Cain (1)

(see under manganese)

KING COUNTY

Aces Up (27)

(see under silver)

Anderson (2)

(see under iron)

Annex (3)

Loc: Secs. 23 and 24, (26-10E), near Lowe Cr. **Owner:** John Maloney, Skykomish, Wash. **Ore:** Copper. **Ref:** 158.

Annex (44)

Loc: NE $\frac{1}{4}$ sec. 2, (23-8E). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 7-ft. vein. **Assays:** \$28 in Au, Ag. **Ref:** 58, p. 4. 63, p. 42.

Apex (8)

(see under gold)

Arizona and Washington

(see under gold)

Baring

(see Anderson under iron)

Bear Basin (30)

(see under silver)

Bear Creek

(see Robinson under gold)

Big Chief

(see under gold)

Black Jack

(see under gold)

Bobtail (29)

Loc: NW $\frac{1}{4}$ sec. 31, (25-11E), Miller R. dist. **Ore:** Copper, gold, silver. **Deposit:** 6-ft. vein with 8 to 16 in. of high-grade ore. **Ref:** 63, p. 38. 158.

Bonanza Queen

(see under gold)

Bondholders Syndicate

(see Apex under gold)

Bridal Veil

(see under gold)

Brooklyn (16)

Loc: Secs. 11 and 13, (25-10E), Miller R. dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 25- and 10-ft. veins with 2- and 4-ft. paystreaks. **Assays:** \$10 to \$20 Au, Ag; 8% to 12% Cu. **Ref:** 63, p. 37.

Brown Bear (52)

Loc: NW $\frac{1}{4}$ sec. 33, (22-10E), across Bear Cr. from Earhart property, Cedar River dist. **Ore:** Copper, silver. **Ore min:** Chalcopyrite, argentite, pyrite, bornite. **Deposit:** 4- to 16-in. quartz vein in granite. **Ref:** 63, p. 47.

Carmack (49)

(see under gold)

Chair Peak

(see Kelley under iron)

Chicago (10)

Loc: Sec. 36, (26-10E), Miller R. dist. **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, native copper, pyrite. **Deposit:** 8-ft. vein in diorite. **Assays:** 20% Cu (1897). **Ref:** 63, pp. 39-40.

Christina

Loc: T. 22 N., R. 10 E., Cedar R. dist. **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** 15-ft. brecciated zone in slate,

filled with ore and quartz. **Assays:** \$6 to \$20 Au; 5% to 75% Cu. **Ref:** 63, p. 48.

Cleopatra (32)
(see under silver)

Cleveland (41)

Loc: SE $\frac{1}{4}$ sec. 25, (24-8E), Snoqualmie dist. **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 20-ft. vein with paystreak on hanging wall. **Assays:** \$40 Au (1897). **Ref:** 63, p. 42.

Climax (7)

Loc: 4 $\frac{1}{2}$ mi. SW. of Baring on S. end of Little Index Mtn., approx. in sec. 20, (26-10E). **Prop:** 8 claims. **Ore:** Copper, silver. **Ore min:** Bornite, chalcopyrite. **Dev:** 200-ft. adit, surface cuts. **Assays:** 10 tons shipped assayed \$50 to \$100 per ton. **Prod:** 10 tons shipped for a smelter test prior to 1901. **Ref:** 88, pp. 85-86.

Clipper (45)

Loc: Sec. 1, (23-11E), sec. 3, (23-12E), sec. 36, (24-11E), and secs. 27 and 34, (24-12E), on Middle Fk. of Snoqualmie R. **Elev:** 3,000 to 5,800 ft. **Access:** 4 mi. by trail N. of Goldmeyer Hot Springs. **Prop:** 15 patented and 14 unpatented claims, including the old Snoqualmie Copper Co. holdings and Katie Belle claim. **Owner:** M. F. and D. D. Gilbreath of the United Cascade Mining Co., Inc. (1942—). **Ore:** Copper, gold, molybdenum. **Ore min:** Largely pyrite, some chalcopyrite, pyrrhotite, molybdenite. **Deposit:** Cross fractures in granodiorite mineralized with pyrite and some chalcopyrite. **Dev:** Short adit. **Assays:** Highest Cu assay in 7 samples was 0.98% Cu across a width of 5 ft. Other assays show 0.015 to 0.04 oz. Au. **Ref:** 91, 1906, p. 247. 133-B, pp. 28-29. 158.

Commonwealth
(see under silver)

Coney Basin (17)
(see under gold)

Copper Bell
(see under gold)

Copper Chief
Loc: Foss R. dist. **Ore:** Copper. **Ref:** 91, p. 247.

Copper Chief (46)
Loc: SW $\frac{1}{4}$ sec. 14, (23-11E), Snoqualmie dist. **Prop:** 1 claim of a group of 3. **Owner:** Cascade Gold Mining & Milling Co. (1892). **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopyrite, galena. **Deposit:** Said to be a large body of chalcopyrite ore in several lead-silver veins. **Assays:** Copper ore said to assay as high as \$103 per ton in copper, gold, and silver. Lead-silver ore returned \$50 to \$130 per ton. **Ref:** 13, p. 168. 63, p. 42.

Copper Duke (4)
(see under gold)

Copper Plate
(see Seattle-Cascade under silver)

Damon and Pythias (9)
(see under gold)

Dawson (19)
(see under lead)

Devils Canyon (34)
(see under molybdenum)

Dutch Miller (33)
Loc: NE $\frac{1}{4}$ sec. 20, (24-13E), at head of Middle Fk. of Snoqualmie R. **Elev:** 5,700 ft. **Access:** 12 mi. by trail from Goldmeyer Hot Springs. **Prop:** 2 patented and 5 unpatented claims.

Owner: A. B. Crain, Cascade Development Co., Seattle, Wash. (1942). Dutch Miller Mining & Smelting Co. (1918). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, arsenopyrite, tetrahedrite, pyrite, secondary copper minerals, galena, sphalerite. **Gangue:** Quartz, tourmaline, siderite, pink chlorite. **Deposit:** 3 parallel en echelon veins along shear zones in granodiorite. Ore occurs as a segregation 25 ft. long and 12 ft. thick in one of the veins. **Dev:** 65-ft. adit, 25-ft. adit, and two shafts. **Assays:** Smelter returns av. \$37.65 per ton after deduction of smelter charges. **Prod:** Several shipments prior to 1901. **Ref:** 33, 1907, p. 360. 88, p. 86. 158.

Emma (47)
Loc: Sec. 14, (23-11E), Gold Cr. area. **Ore:** Copper. **Ref:** 58, p. 20. 63, p. 42.

Etta
Loc: E. of Cleopatra Basin, Miller R. dist. **Ore:** Copper. **Ref:** 63, p. 37.

Eureka (53)
Loc: NW $\frac{1}{4}$ sec. 33, (22-10E), Cedar R. dist. **Ore:** Copper, gold, silver. **Ref:** 63, p. 47.

Eureka
Loc: Miller R. dist. **Ore:** Copper, gold, silver. **Ref:** 91, p. 247.

Fathers Day (39)
Loc: Sec. 16, (24-10E), on Quartz Cr. about $\frac{1}{4}$ mi. above its mouth. **Elev:** 1,600 ft. **Access:** Road up Quartz Cr., thence by trail downhill a few hundred yards. **Prop:** 1 claim. **Owner:** John Jarvis (1950). **Ore:** Copper. **Ore min:** Chalcopyrite, arsenopyrite, pyrite. **Gangue:** Quartz. **Deposit:** A silicified and mineralized zone 10 ft. wide in andesite or fine-grained intrusive rock. **Dev:** 84-ft. adit and open cut. **Ref:** 158.

Foss River (24)
Loc: Sec. 30, (25-12E). **Ore:** Copper, gold, silver. **Ref:** 91, pp. 238-250. 114, no. 6, 1906, p. 79; no. 5, 1909, p. 113.

Geo. W. Tinkle (51)
Loc: Secs. 7 and 8, (22-10E), Snoqualmie dist. **Ore:** Copper. **Deposit:** Similar to Carmack property. **Ref:** 158.

Goat Mountain (36)
(see under lead)

Gold Mountain (5)
(see under silver)

Golden Tunnel (1)
Loc: Sec. 6, (26-11E), near head of Eagle Cr. **Ore:** Copper, gold, silver. **Ref:** 58, p. 25. 63, p. 35.

Hawkeye
(see under gold)

Ironsides
Loc: Cleopatra Basin, Miller R. dist. **Ore:** Copper. **Ref:** 63, p. 37.

Jack Pot (35)
(see under zinc)

Joamco (37)
Loc: Secs. 6, 31, and 32, (25-10E), Buena Vista dist. **Owner:** R. R. Jones, Seattle, Wash. (1941). **Ore:** Copper, Gold. **Ref:** 58, p. 35.

John Stevens
(see Una)

Katie
(see under lead)

Kelley (48)

(see under iron)

King David**Loc:** Summit of Cleopatra Basin, Miller R. dist. **Ore:** Copper. **Ref:** 63, p. 37.**King and Kinney (20)****Loc:** SW $\frac{1}{4}$ sec. 17, (25-11E), on W. side of Miller R. about 5 mi. from its mouth. **Elev:** 400 ft. and 800 ft. above stream. **Access:** Road up Miller R., thence a short distance by trail. **Owner:** Mike Kinney, Skykomish, Wash. (1952). **Ore:** Copper, lead, zinc, silver, gold. **Ore min:** Chalcopyrite, pyrite, galena, sphalerite, malachite. **Gangue:** Quartz. **Deposit:** Fractured and hydrothermally altered brecciated zone in granodiorite in which are mineralized quartz stringers. Zone varies from a few in. to 7 ft. in width. **Dev:** 525-ft. upper adit and a lower adit. **Ref:** 58, p. 37. 158.**Kinney**

(see King and Kinney)

Langer (15A)

(see under zinc)

Last Chance (50)

(see under gold)

Legal Tender (42)

(see under gold)

Lennox (14)

(see under gold)

Le Roi (28)

(see under gold)

Leta (43)

(see under gold)

Little Una

(see under gold)

Lucky Boy**Loc:** Foss R. dist. **Ore:** Copper. **Ref:** 91, p. 246.**Lucky Strike (18)**

(see under gold)

Lynn (21)**Loc:** SE $\frac{1}{4}$ sec. 17, (25-11E), Miller R. dist. **Owner:** Miller River Mining, Milling, & Smelting Co. (1915). **Ore:** Copper, lead. **Ref:** 63, p. 36. 158.**Mastodon**

(see under silver)

May Earhart

(see Robinson under gold)

Middle Fork**Loc:** Along canyon of the Middle Fk. of Snoqualmie R. in vicinity of Burnt Boot Cr. **Access:** Trail. **Prop:** Several prospects. **Ore:** Copper. **Ore min:** Bornite, chalcopyrite. **Gangue:** Quartz. **Deposit:** Copper minerals occur with quartz crystals in pockets in the Snoqualmie granodiorite. **Ref:** 146, p. 14.**Mona**

(see Mono)

Mono (Mona) (6)**Loc:** Sec. 34, (26-11E), on E. side of Miller R. 2 $\frac{1}{2}$ mi. from its mouth. **Access:** 2 $\frac{1}{2}$ mi. by road from railroad at Miller R. **Prop:** 8 claims. **Owner:** Wm. Ellwood, Seattle, Wash. (1952). Cooperative Mining Syndicate (1902). Phoenix Mining Syndicate (1907-1918). **Ore:** Copper, gold, silver, zinc, arsenic. **Ore min:** Arsenopyrite, chalcopyrite, bornite, sphalerite, pyrite.**Gangue:** Apatite, quartz. **Deposit:** Mineralized zone 40 to 54 ft. wide in Keechelus andesite. **Dev:** 3 adits, one 716 ft. long, another 250 ft. long, and another 80 ft. long from which a 90-ft. drift and 52-ft. winze have been driven. **Assays:** Av. about 4% Cu, \$1.25 Au, \$1.75 Ag. **Ref:** 33, 1907, p. 925; 1908, p. 1120. 46, p. 163. 63, p. 38. 88, p. 84. 98, 1918, p. 121. 112, p. 112. 130, p. 59. 147, pp. 184-185. 159, p. 135.**Monte Carlo (12)**

(see under gold)

Mount Phelps (13)

(see under zinc)

Online (56)

(see under gold)

Pedro**Loc:** Foss R. dist. **Ore:** Copper, gold, silver, bismuth, antimony. **Ref:** 91, p. 246.**Portland (25)****Loc:** Sec. 20, (25-11E), Miller R. dist. **Ore:** Copper. **Ref:** 114, no. 5, 1909, p. 112. 147, pp. 154-185.**Pythias**

(see Damon and Pythias under gold)

Quartz Creek (38)

(see also Rainy under gold)

Loc: Sec. 8, or sec. 16, (24-10E), Taylor R. dist. **Access:** 18 mi. by road from railroad at North Bend. **Prop:** Patented claims. This appears to be the same property which is described under the name "Rainy" under gold. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, arsenopyrite, bornite, molybdenite, scheelite, covellite. **Gangue:** Quartz, tourmaline. **Deposit:** Disseminations and replacement in granodiorite breccia. Massive pyrite body 30 ft. in diameter in altered zone 200 ft. by 40 ft. containing also chalcopyrite; 800 ft. W. is a 200-ft. by 100-ft. stockwork zone of quartz veinlets containing arsenopyrite, chalcopyrite, and a little molybdenite; 800 ft. N. in road cut is a 40-ft.-wide sheeted zone with fracture planes lined with chalcopyrite, arsenopyrite, a little molybdenite and scheelite. **Dev:** 50-ft. adit with 40-ft. winze, caved adit, 80-ft. adit. **Improv:** 50-ton flotation mill (1953). **Assays:** One sample showed 0.6% Cu, 0.2 oz. Ag, tr. Au; another sample showed 1.2% Cu, 0.4 oz. Ag, 0.04 oz. Au. **Ref:** 11-A, pp. 233-240. 108, 2/53, p. 103. 111, p. 5.**Rainbow (15)****Loc:** NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 17, (25-10E), on S. side of Lennox R., Buena Vista dist. **Elev:** 2,460 ft. **Access:** $\frac{1}{2}$ mi. by trail from road. **Prop:** 9 unpatented claims. **Owner:** Edwin Sauers and C. L. Johnston, Bremerton, Wash. (1947). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrrhotite. **Deposit:** Iron-stained quartz vein in granite is 6 in. wide and 50 to 75 ft. long. **Improv:** Cabin (1947). **Ref:** 11-A, pp. 231-233. 158.**Rainy (40)**

(see under gold)

Robinson (54)

(see under gold)

Romeo

(see under gold)

San Francisco (11)

(see under gold)

San Jose (55)

(see under gold)

Seattle-Cascade (22)

(see under silver)

Silver Dollar and Copper Plate

(see Seattle-Cascade under silver)

Snoqualmie (31)

Loc: Secs. 14 and 23, (25-10E), Miller R. dist. **Owner:** Cascade Consolidated Mining & Smelting Co. (1934). Snoqualmie Mining Co., Inc. (1908-1926). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Low grade. Gash veins in granodiorite. Some high-grade ore from No. 6 vein. **Dev:** Numerous openings. **Prod:** 1925. **Ref:** 33, 1908, p. 1244. 97, 1925, p. 558. 98, 1925, p. 1833; 1926, p. 1595. 114, no. 5, 1909. 141, p. 22. 158.

Sphinx

Loc: Cleopatra Basin, Miller R. dist. **Ore:** Copper. **Ref:** 63, p. 37.

Square Deal

(see under gold)

Stevens

(see Una)

Sunday

(see under silver)

Surprise

Loc: Snoqualmie dist. **Owner:** Horseshoe Mining Co. (1907-1909). **Ore:** Copper, gold, silver. **Ref:** 33, 1908, p. 794. 105, vol. 98, 1909, p. 680. 116, no. 7, 1907, p. 13.

Tinkle

(see Geo. W. Tinkle)

Triple S

(see Seattle-Cascade under silver)

Twin Lakes

(see under gold)

Una (John Stevens) (23)

Loc: Sec. 17, (25-11E), on Miller R. **Access:** 5½ mi. by road to railroad at Berlin. **Owner:** Consolidated Gold Mines Co. (1908-1909). **Ore:** Copper, silver, gold. **Ore min:** Malachite. **Gangue:** Tourmaline. **Deposit:** 20-ft. body of tourmaline is stained by malachite. **Dev:** 130-ft. adit. **Prod:** 1908. **Ref:** 33, 1908, p. 555. 63, p. 38. 97, 1908, p. 578. 114, no. 5, 1909, p. 112. 147, p. 184.

Unicorn

Loc: Cleopatra Basin, Miller R. dist. **Ore:** Copper. **Ref:** 63, p. 37.

Victoria

(see under gold)

War Eagle (26)

(see under gold)

Washington

(see Arizona and Washington under gold)

Western States Copper

(see Rainy under gold)

Woodline (57)

(see under gold)

KITSAP COUNTY**Chico (1)**

(see under tin)

Cook-Kitchen

(see Chico under tin)

Kitchen

(see Chico under tin)

KITTITAS COUNTY**Aurora (1)**

(see under gold)

Beaver (5)

(see under gold)

Big Bug

Loc: On Fortune Cr., Cle Elum dist. **Ore:** Copper, silver. **Ref:** 63, p. 63.

Big Dome (15)

Loc: Sec. 17, (23-15E) and sec. 13, (23-14E), on Fortune Cr. **Access:** 27 mi. by road from railroad at Roslyn. **Prop:** Several claims. **Owner:** Big Dome Mining Co., Inc., Seattle, Wash. (1949—). **Ore:** Copper, tungsten, reportedly uranium. **Ore min:** Chalcopyrite, scheelite, pyrite. **Gangue:** Granodiorite. **Deposit:** Irregular zones of chalcopyrite and pyrite disseminated in granodiorite. **Dev:** 20-ft. adit, several open cuts. **Improv:** Cabin (1950). **Assays:** Only trace amounts of radioactivity. **Ref:** 69, p. 6. 150, p. 28. 156. 158.

Blue Bonnet (8)

Loc: SE¼ sec. 25, (23-14E), Camp Cr. area. **Owner:** Riley Williams et al., Yakima, Wash. (1952—). **Ore:** Copper, nickel, gold, silver. **Ref:** 133, p. 30.

Bob Canson (6)

Loc: NE¼NE¼ sec. 26, (23-14E). **Access:** Trail. **Owner:** Bob Canson Mining Co. (1938). **Ore:** Copper. **Ore min:** Arsenopyrite, pyrite, a little chalcopyrite. **Deposit:** Mineralized shear zone about 8 in. wide along contact of gray and green volcanic rocks. **Dev:** 70-ft. adit, 90-ft. adit, and an open cut. **Improv:** Cabin (1938). **Ref:** 158.

Bonanza

(see Dolphin)

Boyles (10)

Loc: Sec. 31, (23-15E), Cle Elum dist. **Ore:** Copper, gold, silver. **Ref:** 58, p. 10. 63, p. 64.

Canson

(see Bob Canson)

Cascade Mining (18)

Loc: Near N. line sec. 27, (23-12E), below prominent bench in cirque at head of Gold Cr. **Elev:** 3,800 ft. **Access:** About 6 mi. by trail up Gold Cr. from Snoqualmie Pass highway. **Prop:** 2 patented claims. **Owner:** E. A. Magill, Seattle, Wash. (1951—). Cascade Mining Co. (1906). **Ore:** Copper, lead, silver, gold. **Deposit:** Vein mineralized with lead, silver, copper, and gold, and a wide zone of mineralized granodiorite exposed in the crosscut carries a small percentage of copper. **Dev:** Crosscut adit and a shaft. **Ref:** 146, p. 14. 158.

Copper King

Loc: Cle Elum dist. **Ore:** Copper. **Ref:** 33, 1907, p. 617; 1908, pp. 706-707. 97, 1905, p. 336.

Copper Queen (20)

Loc: Sec. 7, (22-13E), ½ mi. S. of Mineral Cr. near the Mineral Creek mine. **Elev:** 3,500 to 3,820 ft. **Owner:** Cascade Gold Mining & Milling Co. (1952). Mineral Creek Copper Co. (1917-1928). **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Deposit:** Mineralized zones in rhyolite breccia. The greatest lateral dimension of a zone is 40 ft. Believed to be a low-grade deposit. **Dev:** 550-ft. crosscut, 230-ft. crosscut, 65-ft. crosscut. **Assays:** Low copper content. **Ref:** 98, 1922-1926. 129, p. 278. 133, p. 31.

Dolphin (Bonanza) (13)

Loc: Sec. 33, (23-15E), on SE. slope of Mt. Hawkins. **Elev:** 5,800 ft. **Access:** 27 mi. by road to railroad at Ronald. **Owner:** Phil Denny, Seattle, Wash. (1951). Gallagher Mining & Development Co. (1905). Gallagher Mining & Milling Co. (1907-1908). Bonanza Mining Co. (1920). **Ore:** Copper, silver, gold, cobalt reported. **Ore min:** Copper and iron sulfides. **Deposit:** Silicified zone up to 50 ft. wide in serpentine. **Dev:** 300-ft. Dolphin adit, 1,000-ft. drift, 75-ft. adit, 100-ft. shaft. **Assays:** 5 tons shipped from Dolphin adit reported to av. 6% Cu. **Prod:** 1905, 1917 (5 tons). **Ref:** 33, 1907, p. 617; 1908, pp. 706-707. 97, 1905, p. 336; 1917, p. 502. 157.

Durrwachter

(see Mineral Creek)

Fish Eagle

Loc: Fish Lk. area. **Ore:** Copper. **Ref:** 58, p. 22. 63, p. 62.

Grandview (Lost) (14)

Loc: Sec. 33, (23-15E), about $\frac{3}{4}$ mi. E. of Fourth Cr. **Access:** 3½ mi. by trail and 25 mi. by road to railroad at Cle Elum. **Owner:** L. H. West, Cle Elum, Wash. (1948). **Ore:** Copper, gold, nickel. **Ore min:** Native copper. **Deposit:** Slightly mineralized sheer zone in peridotite. **Ref:** 58, p. 27. 144, p. 9. 157.

Granite King (21)

(see under silver)

Grizzly Bear

(see under gold)

Huckleberry (17)

Loc: Secs. 24 and 26, (23-13E), near Lk. Cle Elum, on Mt. Hawkins. **Prop:** 4 claims. **Owner:** S. R. Justham, Seattle, Wash. (1943). **Ore:** Copper, silver, gold. **Gangue:** Quartz. **Deposit:** Vein said to be 8 in. to 4 ft. wide. **Dev:** 600-ft. adit. **Assays:** 14 assays show \$0.06 to \$3.72 Au, \$0.15 to \$26.10 Ag, \$0.55 to \$24.20 Cu. **Prod:** Reportedly 4 carloads shipped to the Tacoma smelter prior to 1935. **Ref:** 13, p. 135. 63, p. 62. 158.

Iias (Williams) (11)

Loc: SW¼ sec. 29, (23-15E), on W. slope of Mt. Hawkins, on N. side of Camp Cr. **Elev:** 5,900 ft. **Access:** 2½ mi. up Camp Cr. trail from the Cle Elum R. road. 24 mi. to Cle Elum. **Prop:** 1 patented claim: Iias; and 1 unpatented claim: Iias Extension. **Owner:** Riley Williams, Yakima, Wash. (1949—). **Ore:** Silver, gold, copper. **Ore min:** Chalcopryrite, pyrrhotite, magnetite. **Gangue:** Quartz. **Deposit:** At creek level are small pods of sulfides in lenticular shear zones in serpentine. Silicified zone in altered volcanic rocks is 20 ft. wide and 500 ft. long. Mineralization negligible. One quartz vein in the zone is 2 ft. wide. **Dev:** 17-ft. shaft, 51-ft. adit now caved, 28-ft. adit, 112-ft. adit, long open cut. **Assays:** Low values in copper at creek level. Of three assays at different points along the vein, two showed nothing and one showed tr. Au, 0.12 oz. Ag. **Ref:** 63, p. 64. 158.

Johnson

Loc: Near Mt. Hawkins, Cle Elum dist. **Ore:** Copper. **Ref:** 63, p. 64.

King Solomon (2)

Loc: Sec. 5, (23-15E), Cle Elum dist. **Ore:** Copper, gold, silver. **Ref:** 58, p. 37.

Last Chance

(see under gold)

Legal Tender

Loc: Cle Elum dist. **Owner:** Gallaher Mining & Milling Co. (1907-1908). **Ore:** Copper, silver, gold. **Ref:** 33, 1907, p. 617; 1908, pp. 706-707. 97, 1905, p. 336.

Liberty Lode

(see Mineral Creek)

Little Kachess Lake

Loc: 2 mi. NW. of Little Kachess Lk. on creek which empties into N. end of the lake. **Elev:** 2,500 to 4,000 ft. **Access:** 6 mi. by trail from Kachess Forest Camp at N. end of Kachess Lk. **Prop:** Several claims. **Ore:** Copper. **Ore min:** Pyrite, chalcopryrite, bornite, arsenopyrite. **Gangue:** Quartz, epidote. **Deposit:** Poorly defined veins in schist, sandstone, slate, and granodiorite. **Ref:** 146, p. 14.

Lost

(see Grandview)

Lynch

(see Aurora under gold)

Majestic

(see under gold)

Mammoth

(see under gold)

Mary

(see under gold)

Mildred

Loc: Snoqualmie dist. **Owner:** Devine Mining Co. (1915). **Ore:** Copper, lead, gold, silver. **Ref:** 158.

Mineral Creek (Durrwachter, Liberty Lode) (19)

Loc: SE¼ sec. 6, (22-13E), on Mineral Cr. 2 mi. above Little Kachess Lk. **Elev:** 2,850 ft. **Access:** 2 mi. by road up Mineral Cr. from Little Kachess Lk. **Prop:** 8 claims and 6 millsites. **Owner:** Cascade Gold Mining & Milling Co., Spokane, Wash. (1951—). Mineral Creek Copper Co. (1917-1926). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite, bornite, molybdenite, pyrrhotite. **Gangue:** Quartz. **Deposit:** Ore minerals occur along narrow shear and joint planes in a 20- to 40-ft. brecciated zone in granodiorite. Also a 500-ft.-wide mineralized breccia contact zone between rhyolite and basalt. **Dev:** 248-ft. adit with 50-ft. winze; 3 other adits totaling several hundred ft. **Assays:** Sample taken across 10 ft. gave 2.75% Cu, 1 oz. Ag, 40¢ Au. A carload of crude ore shipped reportedly av. 6% Cu. **Prod:** 20 tons shipped to Tacoma smelter prior to 1920. **Ref:** 97, 1917, p. 502; 1922, p. 254. 98, 1922-1926. 106, no. 15, 1920, p. 5. 129, pp. 277-278. 133, p. 31. 141, p. 22. 158.

Morning Star (9)

Loc: Sec. 24, (23-14E), Cle Elum dist. **Ore:** Copper, gold, silver. **Ref:** 58, p. 46. 63, p. 65.

Mountain Belle (3)

Loc: Extension of Mountain Chief, 1 mi. above mouth of Fortune Cr., Cle Elum dist. **Ore:** Copper, gold. **Ref:** 63, p. 63.

Mountain Chief (4)

Loc: 1 mi. above mouth of Fortune Cr., Cle Elum dist. **Ore:** Copper, gold. **Ref:** 63, p. 63.

Navidad

Loc: Cle Elum dist. **Owner:** Gallaher Mining & Milling Co. (1907-1908). **Ore:** Copper, gold, silver. **Ref:** 33, 1907, p. 617; 1908, pp. 706-707.

Paramount

(see Aurora under gold)

Ruby King

(see under gold)

Silver Bow

Loc: On Mt. Hawkins, Cle Elum dist. **Owner:** Ben Kelly and Judge Boyles (1892). **Ore:** Copper, gold. **Deposit:** 4-ft. vein. **Dev:** 30-ft. incline. **Assays:** 22½% Cu, \$26 Au. **Ref:** 13, p. 135.

Silver Bullion (12)

Loc: W½ sec. 32, (23-15E), near head of Boulder Cr. **Access:** 2½ mi. by trail from Cle Elum R. road at mouth of Camp Cr. **Prop:** 1 claim. **Owner:** Riley Williams, Yakima, Wash. (1949). **Ore:** Copper. **Ore min:** Magnetite, chalcopryrite, chalcocite. **Gangue:** Serpentine. **Deposit:** Serpentine containing disseminated magnetite in which are scattered crystals of chalcopryrite. **Dev:** 168-ft. shaft. **Assays:** Ore minerals constitute about 3% of the rock. **Ref:** 158.

Silver Dump (7)

(see under silver)

Taneum Creek (22)

Loc: In vicinity of the forks of Taneum Cr., 5 mi. S. of Cle Elum. **Ore:** Copper. **Ore min:** Copper sulfides. **Deposit:** Easton schist seamed with quartz. **Ref:** 144, p. 9.

Teanaway (16)

(see under nickel)

Thorp

(see under gold)

Tip Top

(see under gold)

Tip Top No. 1

(see under gold)

Twin

(see under gold)

Whippoorwill

(see under gold)

Williams

(see Iias)

LEWIS COUNTY

Big Falls (3)

Loc: Secs. 28 and 32, (11-5E), Mt. St. Helens dist. **Ore:** Copper. **Ref:** 158.

Eagle Peak (1)

Loc: Near NW. cor. sec. 27, (15-8E), on W. slope of Eagle Peak, Mt. Rainier area. **Elev:** 3,275 to 3,515 ft. **Access:** 1½ mi. by road above Longmire. 18 mi. to railroad at Ashford. 60 mi. by road to smelter at Tacoma. **Prop:** 2 unpatented claims: Aldula, Paradise. **Owner:** Eagle Peak Copper Mining Co., R. H. Wheelock, Ashford, Wash. (1908—). **Ore:** Copper, gold, silver, cobalt, uranium (?). **Ore min:** Chalcopryrite, pyrite, bornite, arsenopryrite, covellite, scheelite, molybdenite, sphalerite, linnaeite. **Deposit:** Mineralized joints or slip planes in granite. One zone is 6 in. to 5 ft. in width and carries a streak of high-grade ore 1 to 14 in. wide. Gold values are in the arsenopryrite. Ore from near portal of old drift about 15 ft. above present drift level was slightly radioactive. **Dev:** 300-ft. drift, 630-ft. crosscut. **Assays:** 18-ton shipment yielded 8.05% Cu, 0.09 oz. Au, 1.87 oz. Ag. 1% to 5% Co in some samples. **Prod:** 100 tons in 1919. Produced also 1925, 1928. Not over 200 tons total. **Ref:** 58, p. 19. 97, 1919, p. 493; 1925, p. 559; 1928, p. 701. 98, 1918-1926. 129, pp. 310-312. 157.

Green River (5)

Loc: NW¼ sec. 33, (11-5E), Mt. St. Helens dist. **Prop:** 2 claims (part of Big Falls group). **Ore:** Copper. **Ref:** 158.

Paradise (2)

Loc: Sec. 27, (15-8E), adjoining Eagle Peak property on the S., Mt. Rainier dist. **Access:** 2,400 ft. E. of Mt. Rainier highway above Longmire. **Prop:** 2 unpatented claims: Iva Henry Nos. 1 and 2. **Owner:** Paradise Mining Co. (1918-1921). **Ore:** Copper. **Ore min:** Chalcopryrite, bornite, arsenopryrite, pyrite. **Gangue:** Quartz, calcite. **Deposit:** Mineralized slip plane in andesite carries 4 to 8 in. of ore and minor parallel streaks of ore. **Dev:** 440-ft. adit, short drift, and open cut. **Improv:** 2,400-ft. aerial cable. (1921). **Assays:** 40-ton shipment said to assay 10% Cu. **Prod:** Reportedly 40 tons shipped prior to 1921. **Ref:** 97, 1918, p. 506. 129, p. 312.

Rocky Point (4)

Loc: SE¼ sec. 31, (11-5E), Mt. St. Helens dist. **Prop:** 6 claims: Rocky Point Nos. 1 to 6. **Ore:** Copper. **Ref:** 158.

Short Canyon

Loc: Mt. Rainier area. **Owner:** Short Canyon Mining Co. (1915). **Ore:** Copper, molybdenum. **Prod:** 1911. **Ref:** 158.

LINCOLN COUNTY

Crystal (1)

(see under lead)

Fouress (3)

(see under zinc)

Heart (4)

Loc: Sec. 20, (26-38E), 5 mi. NW. of Mondovi. **Owner:** Heart estate leasing to C. W. Minnick, Medical Lake, Wash. (1943). **Ore:** Copper. **Ore min:** Copper carbonate (stains only). **Deposit:** Quartz pegmatite dike in argillite. Within an exposed distance of several hundred ft. the dike pinches and swells several times within the range of 0 to 4 ft. "Ore" consists of copper-stained quartz, feldspar, and mica. **Dev:** 10-ft. shaft. **Ref:** 157.

Iron Crown

(see under gold)

Lincoln (2)

Loc: NE¼SE¼ sec. 20, (28-36E), 1 mi. up Spokane R. from military buildings. **Owner:** Lincoln Mining & Milling Co. (1939). **Ore:** Copper, lead. **Ore min:** Pyrrhotite, chalcopryrite, pyrite, galena. **Gangue:** Dolomite, actinolite, tremolite. **Deposit:** Mineralized zone along contact of granite with dolomite. **Ref:** 158.

Pitney Butte

(see Fouress under zinc)

Silver Queen

(see under silver)

MASON COUNTY

Arkansas Traveler (3)

(see under manganese)

Black Tail (1)

Loc: Sec. 9, (24-5W), 2 mi. N. of Black and White property. **Ore:** Copper. **Ore min:** Chalcopryrite. **Gangue:** Calcite. **Ref:** 124, p. 240.

Black and White (2)

Loc: Sec. 17, or NW¼ sec. 21, (24-5W), on divide E. of N. Fk. Skokomish R. **Elev:** 4,250 ft. **Access:** 5-mi. trail from Cushman Lk. road. **Owner:** Olympic Mines, Inc. (1943). **Ore:** Copper, manganese. **Ore min:** Bementite, neotocite, native copper, cuprite, rhodonite, rhodochrosite, manganocalcite, chal-

cocite, chalcotrichite, malachite, azurite. **Gangue:** Jasper. **Deposit:** 3 lenses of ore along altered basalt-phyllite graywacke contact. 1 lens has max. width of 8 ft. but pinches and swells. **Dev:** 200-ft. adit, 40-ft. shaft, and several open cuts and pits. **Assays:** 5-ton shipment contained 0.40 oz. Ag, 7.85% Cu, 3.2% Fe, 65% insol. Composite sample of 125 tons contained 5.63% Cu, 0.12% Ni and Co, 19.72% MnO, 7.44% Fe₂O₃, 3.84% CaO, 5.15% H₂O, 57.2% insol., tr. Zn and Mg. **Prod:** 5.012 dry tons of ore 1915. **Ref:** 48-A, pp. 40-41. 94, p. 23. 124, pp. 239-240. 127, pp. 453-454. 141, pp. 81, 83. 158.

OKANOGAN COUNTY

Abernathy (Antimony Gold) (144)

Loc: Sec. 31, (35-19E), ¼ mi. NW. of Abernathy Peak. **Elev:** 7,500 ft. **Access:** About 5 mi. by trail from Gilbert at the terminus of the Twisp R. road. **Owner:** R. Abernathy, Los Angeles, Calif. (1946). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, arsenopyrite, pyrite. **Gangue:** Quartz. **Deposit:** A 6-ft. shear zone in andesite is bounded on each side by quartz veins up to 14 in. wide. **Dev:** 40-ft. drift, shaft, and an open cut. **Assays:** 0.3 to 1.0 oz. Au. **Ref:** 158.

Adams

(see Moncosilgo)

Alder (190)

(see under gold)

Alta Lake (224)

(see under nickel)

American Flag (86)

Loc: NE¼ sec. 36, (38-31E), Wauconda dist. **Elev:** 4,500 ft. **Access:** 13 mi. by road NW. of Republic. **Prop:** 1 claim. **Owner:** American Flag Mining Co. (1926). **Ore:** Copper, silver, gold, zinc. **Ore min:** Chalcopyrite, bornite, sphalerite, pyrite, argentite, malachite. **Gangue:** Quartz, fluorite. **Deposit:** Ore occurs in a highly silicified zone 2 to 8 ft. wide in phonolite. Ore minerals occur as shoots in the zone. One such shoot was 16 ft. long. **Dev:** 97-ft. drift in which is a 97-ft. winze. **Assays:** smelter certificates for two 30-ton shipments show an av. of 36% Cu, 16 oz. Ag, 0.10 oz. Au. **Prod:** Shipped 60 tons about 1918. **Ref:** 46, pp. 172-173. 97, 1905, p. 336; 1918, p. 506. 98, 1922-1926. 106, 3/5/31. 129, pp. 196-198.

American Flag (137)

(see under gold)

American Rand

(see Spokane under gold)

Anaconda (44)

(see under gold)

Anchor (117)

(see under silver)

Andy O

(see Andy O'Neil under silver)

Andy O'Neil (113)

(see under silver)

Anna (108)

(see under silver)

Anna B.

(see Ironsides and Anna B.)

Antimony Gold

(see Abernathy)

Antimony Queen (198)

(see under antimony)

Apache (118)

(see under silver)

Apex (Ben Harrison) (65)

Loc: Near SW. cor. sec. 17, (40-30E). **Access:** ½ mi. N. of Chesaw. **Prop:** 6 claims. **Owner:** Apex Gold Mining Co. (1911-1926). Ben Harrison Gold & Copper Mining Co. (1908-1918). British Columbia Copper Co. (1908 and 1916). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, lesser amounts of galena and sphalerite. **Deposit:** Quartz vein as much as 6 ft. wide enclosed in schist and quartzite. Ore occurs in joints and crevices in the quartz. **Dev:** 286-ft. inclined shaft, several small surface openings. Short drifts and a crosscut at bottom of the shaft. **Assays:** Carefully hand-sorted ore said to run about 2 oz. Au. Gold occurs in the pyrite and chalcopyrite. **Ref:** 33, 1908, p. 413. 98, 1918, 1922. 112, 1918, p. 166. 154, p. 49.

Arizona

(see Horn Silver under silver)

Arlington (182)

(see under silver)

Auberton

(see Windiate-Auberton under tungsten)

Aztec (72)

(see under iron)

Baltimore (42)

(see under gold)

Bellevue (49)

(see under gold)

Ben Harrison

(see Apex)

Bergman

(see Shaw-Bergman)

Billy Goat (3)

Loc: Near SE. cor. sec. 15, (38-20E), on S. slope of Billy Goat Mtn., NW. of Winthrop. **Elev:** 4,500 to 5,300 ft. **Access:** Road up Eightmile Cr. 80 mi. from railroad at Pateros. **Prop:** 4 claims: Billy Goat and Billy Goat Nos. 2 to 4. **Owner:** W. F. Berge, R. E. Johnson, Clint Hanks, Fred Hasse, and Mrs. Charles (Della) Graff (1946). **Ore:** Copper, gold, silver, zinc, molybdenum, lead. **Ore min:** Molybdenite, pyrite, chalcopyrite, sphalerite, galena, tetrahedrite. **Gangue:** Quartz, ankerite. **Deposit:** Mineralized quartz veinlets ¼ in. to 2 in. wide lace through altered volcanic rock. A large area is mineralized. **Dev:** Three shafts 20, 40, and 60 ft. deep; three adits 60, 15 ft., and one of unknown length; and a 700-ft. drift. **Assays:** Copper generally less than 1% but in places as much as 2% over minable widths. Gold also low but as much as 0.5 oz. per ton in places. **Ref:** 46, p. 176. 104, 8/30/34, p. 22. 106, 7/34. 158.

Bi-Metallic (84)

(see under molybdenum)

Black Bear (38)

(see under gold)

Black Huzzar

(see under silver)

Black Jack (200)

(see under gold)

Black Warrior

(see under gold)

Blue Grouse (172)

(see under lead)

Blue Lake (151)

Loc: SW $\frac{1}{4}$ sec. 21, (37-25E), on E. side of northward-trending ridge from Goat Mtn. **Elev:** 3,100 ft. **Prop:** 20 claims. **Owner:** Blue Lake Gold and Copper Mining, Smelting, & Power Co. (1902-1908). **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** Several small quartz stringers in granodiorite contain a little chalcopyrite. **Dev:** 300-ft. adit in granodiorite. **Assays:** 5,000 tons assayed \$3 to \$11 Au, 3% to 49% Cu. **Prod:** 5,000 tons taken out in 1901. **Ref:** 33, 1908, p. 384. 75, p. 35. 88, p. 33.

Bolinger (199)

(see under gold)

Bonanza (88)

Loc: Sec. 1, (34-31E), Park City dist. **Owner:** Harry Crouse (1913). **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite, malachite. **Deposit:** Argillite and schist cut by irregular quartz vein. One vein is of white quartz 20 ft. wide showing a sulfide grain here and there. **Ref:** 122, p. 102.

Bornite

(see Peacock)

Buckeye (43)

Loc: Sec. 26, (39-26E). **Prop:** 1 claim. **Owner:** A. M. Wehe, Wehesville, Wash. (1911). **Ore:** Copper, lead, gold, silver. **Ore min:** Pyrite, chalcopyrite, galena, occasionally stephanite. **Deposit:** Vein about 1 ft. wide enclosed in quartzite and siliceous schist. **Dev:** Minor. **Assays:** Gold said to predominate over silver. **Ref:** 154, p. 102.

Buckeye

(see under silver)

Buckhorn

(see Magnetic under iron)

Bunker Hill

(see Silver King under lead)

Caaba

(see Kaaba under lead)

California (13)

Loc: Sec. 23, (40-25E), near S. base of Little Chopaka Mtn., Nighthawk dist. **Prop:** 1 claim. **Ore:** Copper, lead, zinc. **Ore min:** Chalcopyrite, bornite, pyrite, sphalerite, galena, malachite, limonite. **Gangue:** Quartz, garnet. **Deposit:** 6- to 12-ft. quartz vein in granite. Ore minerals occur as patches in the quartz and are arranged with a degree of parallelism. **Dev:** 150-ft. adit. **Ref:** 46, pp. 220-221. 154, p. 92.

Campbell

(see Holden-Campbell under gold)

Caribou (83)

(see under gold)

Carr (4)

Loc: Secs. 14 and 15, (38-20E), adjacent to Billy Goat prospect. **Access:** Road up Eightmile Cr. **Prop:** 4 unpatented claims. **Owner:** Ralph Kennison, Winthrop, Wash. (1946). **Ore:** Copper, gold, silver, lead, zinc, molybdenum. **Ore min:** Pyrite, chalcopyrite, sphalerite, galena, molybdenite. **Deposit:** Fractured and silicified volcanic rock containing mineralized stringers. **Dev:** 2 adits 10 to 20 ft. long. **Assays:** Similar to those of the Billy Goat. **Ref:** 158.

Castle Creek (90)

(see under lead)

Catherine (14)

(see under silver)

Central (Trinidad) (154)

(see under silver)

Central (American Flag)

(see American Flag under gold)

Chicago (204)

(see under gold)

Chicago and New York

(see under gold)

Chickamun (195)

Loc: Sec. 4, (32-22E) and sec. 33, (33-22E), Twisp dist. **Owner:** Geo. Gibson, John Russell, and John Thomas, Twisp, Wash. (1951-1952). **Ore:** Copper, silver gold. **Ref:** 133, p. 31. 150, p. 29.

Chief Sunshine (168)

(see under silver)

Chloride

(see under silver)

Chopaka (63)

(see under silver)

Climax (129)

Loc: SW $\frac{1}{4}$ sec. 14, (36-19E). **Elev:** 2,400 ft. **Access:** About 1 mi. NW. of Mazama. **Prop:** 5 unpatented claims. **Owner:** Ed Kagel, Mazama, Wash. (1933). **Ore:** Copper, zinc. **Ore min:** Pyrite, chalcopyrite, sphalerite, secondary copper minerals. **Gangue:** Quartz, calcite. **Deposit:** Fracture in andesite filled with quartz and calcite and sparsely mineralized. **Dev:** 130-ft. drift and a shallow shaft. **Ref:** 158.

Continental

(see Mazama Queen under gold)

Controller (125)

Loc: Sec. 36, (31-31E). **Access:** 7 mi. SSW. of Nespelem. **Ore:** Copper, silver, zinc. **Ore min:** Magnetite, pyrite, chalcopyrite, sphalerite. **Gangue:** Vesuvianite, red and green garnet. **Deposit:** Limy argillite and impure limestone surrounded and metamorphosed by granite. **Dev:** Shaft. **Assays:** A fairly representative sample from one of the dumps assayed 1.2 oz. Ag, 1.9% Cu. **Ref:** 122, p. 81.

Copper Glance (8)

Loc: NE $\frac{1}{4}$ sec. 35, (38-20E), about 2 mi. SE. of the Billy Goat group, Eightmile Cr. area. **Elev:** 5,500 to 5,700 ft. **Access:** 1 $\frac{1}{2}$ mi. by trail from the end of Eightmile Cr. road. **Prop:** 12 unpatented claims and a millsite. **Owner:** Copper Glance Mining Co., Seattle, Wash. (1947-1952). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite, chalcocite, hematite. **Gangue:** Quartz, calcite, barite. **Deposit:** Fracture zone in andesite 80 to 100 ft. wide has been mineralized in places by copper and a little gold and silver. **Dev:** 200-ft. adit, 50-ft. adit, and several open cuts. **Improv:** Cabin (1948). **Assays:** Low values in copper, gold, and silver over minable widths. **Prod:** 2 tons of hand-sorted ore shipped in 1914. **Ref:** 97, 1915, p. 571. 133, p. 32. 158.

Copper King (23)

Loc: Sec. 17, (39-26E), Palmer Mtn. dist. **Owner:** Copper World Gold Mining & Smelting Co. (1915-1924). **Ore:** Copper, gold. **Ref:** 63, p. 103. 98, 1918-1925.

Copper King (157)

(see under lead)

Copper Queen (73)

Loc: NW $\frac{1}{4}$ sec. 24, (40-30E), Myers Cr. dist. **Prop:** 1 claim. **Ore:** Copper. **Ore min:** Magnetite, chalcopyrite, pyrrhotite, pyrite, scheelite. **Gangue:** Garnet, epidote, quartz. **Deposit:** A 2-ft.

shear zone in quartzite and garnet-epidote rock carries disseminated ore minerals. **Dev:** 100-ft. adit, 30-ft. adit, deep shaft, 8 or more open cuts. **Assays:** Scheelite constitutes only a fraction of 1% of the zone. **Ref:** 158.

Copper Queen

Loc: On Kruger Mtn., Oroville dist. **Ore:** Copper. **Ore min:** Copper sulfides. **Gangue:** Quartz. **Ref:** 63, p. 103.

Copper World (24)

Loc: S½SW¼ sec. 20, (39-26E). Joins Copper World Extension on the W., on Palmer Mtn. **Elev:** 2,000 to 2,500 ft. above the valley floor. **Prop:** 1 patented claim: Copper World. **Owner:** Jerome J. Drumbheller, Spokane, Wash. (1942). Copper World Gold Mining & Smelting Co. (1915-1924). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, arsenopyrite, pyrrhotite. **Deposit:** Vein enclosed in schist and slate contains intermixed fragments of these rocks. The vein is traceable on the surface for some distance. **Dev:** 135-ft. inclined shaft which ran out of ore at a depth of 35 ft., and 2 shallow shafts. **Assays:** Surface ore said to assay 35% Cu, \$5 Au, \$2.50 Ag. **Ref:** 63, p. 101. 98, 1922, p. 1641; 1925, p. 1812. 105, 1906, p. 427. 112, p. 175. 154, p. 104. 158.

Copper World Extension (Iron Mask) (25)

Loc: S½ sec. 20 and N½ sec. 29, (39-26E), just W. of the summit of central part of Palmer Mtn. **Elev:** 4,100 ft., 2,000 to 2,500 ft. above valley floor. **Access:** 3 mi. SE. of Palmer Lk. by road. **Prop:** 11 patented claims: Homestake, Caylor, Iron Mask, Three Links, Rainy Day, 20th Century, Columbus, Anaconda, Lottie. **Owner:** Copper World Extension Mining & Smelting Co., Columbus, Ohio (1907-1942). Leased to John H. Snyder, Columbus, Ohio (1942). Leased to Dempster Bros. (World War I). **Ore:** Copper, gold, silver, tungsten. **Ore min:** Pyrite, chalcopryrite, azurite, malachite, pyrrhotite, arsenopyrite, magnetite, sphalerite. **Gangue:** Quartz. **Deposit:** Series of overlapping tabular lenses in shear zones, the principal one being about 100 ft. wide, along the contact between siliceous limestone and greenstone. The lenses consist of solid pyrite and chalcopryrite. Lenses seldom more than a few hundred tons. **Dev:** 300-ft. vertical shaft with drifting on 100-ft. intervals. Most work on 100-ft. and 200-ft. levels. About 1,900 ft. total. **Assays:** Mining ore—2½% to 4% Cu, 1 oz. Ag, \$0.50 to \$1.00 Au. 3,486 tons produced 1918-1919 av. 3.147% Cu, 0.42 oz. Ag, 0.03 oz. Au. **Prod:** Prior to 1911. Also 1918, 1919 (3,486 tons). **Ref:** 33, 1907, p. 538; 1908, p. 598. 91, pp. 249-250. 97, 1918, p. 507; 1919, p. 503; 1920, p. 268. 98, 1918-1926. 105, 1905, p. 300. 112, p. 174. 129, pp. 240-243. 130, p. 63. 154, pp. 102-103. 158.

Copper Zone

Loc: Conconully dist. **Owner:** Wm. Hargrove and Henry Baker, Conconully, Wash. (1941). **Ore:** Copper, silver, lead. **Prod:** 1937. **Ref:** 58, p. 16. 97, 1938, p. 459.

Crescent (147)

Loc: N. center sec. 15, (34-18E), on Crescent Mtn. **Elev:** 4,500 ft. **Access:** About 1½ mi. by trail SW. of Gilbert, terminus of the Twisp R. road. **Prop:** 2 unpatented claims. **Owner:** L. L. LaMotte and F. C. Blocksom, Twisp, Wash. (1946). **Ore:** Copper. **Ore min:** Pyrite, chalcopryrite. **Deposit:** Highly fractured schist, quartzite, and siliceous limestone are slightly mineralized in places. **Dev:** 1,000-ft. adit. **Ref:** 158.

Crescent

(see Triune under gold)

Crown Point

(see Imperial under gold)

Crystal Butte (Mother Lode) (70)

(see under gold)

Crystal Butte (71)

(see under iron)

Crystalite

(see under gold)

Cumberland

Loc: On Bear Cr. at foot of Gilbert Mtn., Twisp dist. **Ore:** Copper. **Ore min:** Copper sulfide. **Ref:** 63, p. 91.

Daisy (130)

(see under gold)

Damfino (203)

(see under gold)

Delate (64)

Loc: SE¼ sec. 8, (40-30E). **Prop:** 1 claim. **Ore:** Copper, lead. **Ore min:** Pyrite, galena, bornite. **Gangue:** Quartz, calcite. **Deposit:** Ore occurs as limited fillings along joints and fractures in quartzite. **Dev:** Short adit with drifts to E. and W. total about 300 ft. **Ref:** 105, 1903, p. 295. 154, p. 52.

Denver City

(see Leadville under gold)

Detroit-Windsor (36)

(see under gold)

Dividend

Loc: W. of Osoyoos Lk., approx. sec. 7, (40-27E). **Ore:** Copper, gold, silver. **Deposit:** Large low-grade disseminated deposit in diorite and lime silicate rocks. **Dev:** Adit. **Assays:** Said to av. 1.25% Cu, \$0.75 to \$1.00 Au and Ag. **Ref:** 54, pp. 7, 8-9.

Dixie Queen

(see Antimony Queen under antimony)

Doris Barbara (205)

(see under tungsten)

Double Header

(see Little Chief under silver)

Double Standard (32)

Loc: Near W. ¼ cor. sec. 28, (39-25E), Palmer Mtn. dist. **Ore:** Copper. **Ref:** 63, p. 104.

Dutch John (197)

(see under tungsten)

Eloise (15)

(see under silver)

Emerald (214)

(see under gold)

Empire (22)

(see under gold)

Esther (158)

(see under lead)

Eureka (91)

(see under lead)

Eureka

(see under lead)

Eureka

(see under silver)

Evening (114)

(see under silver)

Evening Star (159)

(see under silver)

Favorite (62)

(see under lead)

First Thought (179)

(see under silver)

Floyd (Schoenfeld) (191)

Loc: SW $\frac{1}{4}$ sec. 18, (33-22E), Twisp dist. **Access:** Road. **Owner:** Fred Floyd, Twisp, Wash. (1951). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Pyritized greenstone with local concentrations of chalcopyrite up to 80 ft. wide. **Ref:** 158.

Fluorspar

(see Tonasket)

49th Parallel (52)

Loc: NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, (40-27E), 1,500 ft. NW. of O.K. copper mine. **Elev:** 1,200 ft. **Access:** 1 mi. of truck road westward from $\frac{1}{2}$ mi. S. of U. S. Customs depot. **Prop:** 5 claims. **Owner:** Kent Hageberge, Oroville, Wash. (1943). **Ore:** Copper, gold, tungsten. **Ore min:** Chalcopyrite, bornite, pyrite, scheelite. **Deposit:** Fracture zone in greenstone 5 ft. wide contains mineralized quartz veinlets up to 12 in. wide. **Dev:** 145-ft. adit, 100-ft. adit, and two 20-ft. adits, also an incline and four shafts. **Assays:** \$14 to \$58 Cu and Au. **Prod:** Gold-copper ore in 1914. **Ref:** 37, p. 33. 64, p. 85. 97, 1915, p. 572. 129, p. 246. 154, p. 89. 158.

Four Aces (219)

(see under gold)

Four Metals (16)

(see under lead)

Fourth of July (183)

(see under silver)

Frankie Boy (171)

(see under silver)

Friday (222)

(see under gold)

Frosty

(see under gold)

Fuller (223)

(see under iron)

Gearhart (26)

Loc: SW $\frac{1}{4}$ sec. 19, (39-26E), Palmer Mtn. dist. **Ore:** Copper. **Ref:** 114, no. 5, 1909, p. 80.

Gloucester

Loc: Myers Cr. dist. **Owner:** British Columbia Copper Co., Ltd. (1908-1916). **Ore:** Copper. **Ref:** 33, 1908, p. 413.

Goat Creek

Loc: On Goat Cr., Mazama area. **Prop:** 9 claims. **Owner:** Goat Creek Mining Co. (1902-1907). **Ore:** Copper, gold, silver. **Deposit:** 5-ft. vein. **Dev:** 127-ft. shaft, 25-ft. shaft, 350-ft. crosscut with 50-ft. drift. **Assays:** Av. 16% Cu, \$2 Au, 14 oz. Ag (1902). **Ref:** 33, 1907, p. 628. 88, pp. 35-36.

Gold Axe

(see under gold)

Gold Crown (12)

(see under gold)

Gold Crown

(see Spokane under gold)

Gold Dust (53)

Loc: Adjoins the Dividend property on the S. Approx. sec. 7, (40-27E). **Prop:** 1 claim. **Ore:** Copper, gold, silver. **Deposit:** Reportedly 3 mineralized belts in diorite and lime silicate rocks.

Assays: Wide disseminated zone said to assay 1.25% Cu, \$0.75 to \$1.00 Au and Ag. **Ref:** 54, p. 9.

Gold Hill (33)

(see under gold)

Gold Key (138)

(see under gold)

Golden Chariot (54)

Loc: SE $\frac{1}{4}$ sec. 6 and NE $\frac{1}{4}$ sec. 7, (40-27E), Oroville dist. **Elev:** 1,500 ft. **Access:** 1 mi. of truck road connects with county road to the E. **Prop:** 4 patented claims: Waverly, Golden Chariot, Gold Boy, New Year. **Owner:** Stock company under management of W. H. Thomas, Oroville, Wash. (1943). Golden Chariot Mining & Smelting Co. (1907-1912). **Ore:** Copper, silver, gold, molybdenum, tungsten. **Ore min:** Chalcopyrite, pyrite, scheelite, molybdenite. **Deposit:** Ore zone 5 ft. wide consists of a series of S-shaped mineralized quartz lenses filling fractures in argillite. **Dev:** 350-ft. inclined shaft with considerable drifts and stopes. Also several open cuts. **Assays:** \$2 to \$9 Ag. As much as 0.8% scheelite. **Prod:** \$4,000 prior to 1911. 9 cars hand-sorted ore shipped sometime later. **Ref:** 37, pp. 32-33. 64, p. 85. 97, 1912, p. 921; 1916, p. 613. 112, p. 180. 116, no. 7, 1907, p. 8; no. 8, 1907, p. 14. 129, p. 246. 154, pp. 87-88. 157. 158.

Golden Zone (9)

(see under gold)

Goodenuf (102)

(see under silver)

Grand Coulee

(see Little Chief under silver)

Grand Summit

(see Palmer Summit under gold)

Grandview (Leadville)

(see Leadville under gold)

Grandview

(see under gold)

Grant

(see Roosevelt under iron)

Gray Eagle (220)

(see under gold)

Great Divide (111)

(see under silver)

Great Metals

(see Anchor under silver)

Grover Cleveland

(see under lead)

Grubscher

(see Gubser under lead)

Gubser (160)

(see under lead)

Hanks (7)

Loc: Near NW. cor. sec. 23, (38-20E), adjacent to Billy Goat prospect. **Elev:** 4,600 to 4,700 ft. **Access:** Road up Eightmile Cr. **Prop:** 3 unpatented claims. **Owner:** Clint Hanks, Winthrop, Wash. (1946). **Ore:** Copper, gold, silver, lead, zinc. **Ore min:** Pyrite, chalcopyrite, sphalerite, galena, molybdenite. **Deposit:** Similar to that of Billy Goat prospect. Small mineralized quartz veinlets in a wide area of altered volcanic rock. **Dev:** 2 adits 20 to 30 ft. long and several open cuts. **Improv:** Cabin (1946). **Ref:** 158.

Hargrove

(see Silver King under lead)

Hart Stone

(see Kelsey)

Henrietta (208)

(see under gold)

Hercules (97)

(see under lead)

Hercules (34)

(see under gold)

Hiawatha (46)

(see under gold)

Hidden Treasure (100)

Loc: Sec. 33, (32-30E). **Access:** 5 mi. NW. of Nespelem and about 1 mi. N. of the Nespelem-Omak road. **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, pyrite, magnetite, specularite. **Gangue:** Vesuvianite, hornblende. **Deposit:** Small body of argillite and schist surrounded and metamorphosed by granite. **Dev:** Several shafts to depths of at least 40 ft. **Assays:** Sample selected from one of the dumps assayed 2.16 oz. Ag, tr. Au, 5.15% Cu. **Ref:** 122, p. 82.

Hidden Treasure (Highland) (209)

(see under gold)

Highland (210)

(see under gold)

Highland Light

(see Highland under gold)

Hilo

(see St. Paul under silver)

Holden-Campbell (206)

(see under gold)

Home Run (103)

(see under silver)

Horn Silver (61)

(see under silver)

Hotchkiss

(see Mazama Pride under gold)

Hudnut (Hudnutt) (109)

(see under zinc)

Hunter (211)

(see under gold)

I Just Live Here (207)

Loc: NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 10, (30-22E), on ridge top $\frac{1}{2}$ mi. NE. of Doris Barbara prospect. **Prop:** Part of Holden-Campbell group. **Ore:** Copper. **Ore min:** Copper stains. **Deposit:** A 4- to 5-ft. quartz vein. **Dev:** Several small open cuts. **Ref:** 158.

Imperial (134)

(see under gold)

Independence (202)

(see under gold)

Index

Loc: Twisp dist., near Gilbert. **Owner:** Twisp Gold Copper Mining Co. (1907-1918). **Ore:** Copper. **Ref:** 33, 1908, p. 1346, 98, 1918, p. 141. 116, no. 7, 1907, p. 33; no. 9, 1907, p. 17.

International

Loc: On Kruger Mtn., Oroville dist. **Ore:** Copper, gold. **Dev:** 25-ft. shaft. **Ref:** 63, p. 103.

Iron Cap and Snow Cap (145)

(see under gold)

Iron Dike (94)

(see under zinc)

Iron Mask

(see Copper World Extension)

Ironsides and Anna B. (75)

Loc: Sec. 24, (40-30E), $\frac{1}{2}$ mi. S. of the Western Star property. **Ore:** Copper, gold. **Deposit:** Reportedly a continuation of the Western Star deposit. **Assays:** Said to be good copper-gold values. **Ref:** 54.

Jackpot (76)

(see under gold)

Japan

Loc: Mazama dist. **Owner:** Hillcrest Copper Co. (1918). **Ore:** Copper, gold, silver. **Ref:** 112, p. 182.

John Judge

(see Leadville under gold)

Jones (143)

Loc: N. center sec. 24, (35-21E). **Access:** 3 mi. NE. of Winthrop. **Prop:** Deeded land. **Owner:** Jack Jones, Winthrop, Wash. (1946). **Ore:** Copper, silver, gold, mercury. **Ore min:** Malachite, chrysocolla, cinnabar. **Gangue:** Quartz, calcite. **Deposit:** Altered and fractured volcanic rock contains siliceous zones and very small quartz-calcite veinlets. Disseminated copper minerals occur in parts of the zones, and one zone contains a little cinnabar. **Dev:** 1 open cut. **Assays:** 1 selected specimen assayed 0.56% Cu, 0.16 oz. Ag, tr. Au. Select specimens of cinnabar-bearing material said to assay 0.2% Hg. **Ref:** 158.

Josie

(see Hiawatha under gold)

Jumbo (99)

(see under chromium)

Jupiter

(see Tip Top)

Kaaba (17)

(see under lead)

Kaaba-Texas

(see Kaaba under lead)

Kalamazoo (41)

Loc: NW $\frac{1}{4}$ sec. 33, (39-26E), Palmer Mtn. dist. **Ore:** Copper. **Ref:** 63, p. 101.

Kankakee (115)

Loc: Near NW. cor. sec. 22, (31-30E), Nespelem dist. **Owner:** William Bernard and E. Christianson (1939). Kankakee Mining Co. (1918-1926). **Ore:** Copper, lead, silver. **Ore min:** Chalcopyrite, pyrite, argentite (?). **Gangue:** Fluorite, quartz. **Deposit:** Weak mineralization along fractures in granite and quartzite. One 2-in. quartz vein. **Dev:** 2 levels connected by raise. **Prod:** Small test shipment of oxidized lead ore. **Ref:** 97, 1925, p. 559. 98, 1920-1926. 112, p. 186. 158.

Kansas (173)

Loc: Sec. 30, (35-25E), Conconully dist. **Ore:** Copper, lead, silver. **Ref:** 58, p. 36.

Kelsey (Hart Stone, Stone) (55)

Loc: At common corner of secs. 5, 6, 7, and 8, (40-27E), W. of Osoyoos Lk. **Elev:** 1,100 to 1,600 ft. **Access:** 4 mi. N. of Oroville. **Prop:** 9 patented claims. Tunnel Site, Ivanhoe No. 2, Osoyoos Lode, Washington, Alhambra, Big Iron Nos. 1 and 2, Little Lake, Denver. **Owner:** Joe Stone, Chewelah, Wash.

(1943). Detroit-Oroville Exploration Co. (1911). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, pyrite, magnetite, pyrrhotite. **Gangue:** Quartz, garnet, epidote. **Deposit:** Greenstone, slate, and quartzite contain disseminated ore minerals and mineralized quartz stringers along joints and fractures. Apparently a large low-grade deposit. Also some tactite which carries magnetite, chalcopyrite, and pyrrhotite. **Dev:** Several small open cuts and shafts in addition to 6 diamond drill holes each about 100 ft. deep. **Assays:** Av. of 18 assays gave 2.62% Cu, 0.6 oz. Ag, 0.04 oz. Au. **Ref:** 33, 1908, p. 628. 154, pp. 85-87.

Key (161)

(see under silver)

Kimberly (45)

(see under lead)

King Solomon

(see under gold)

Lady of the Lake (167)

(see under silver)

Laeuna

(see Leuena under silver)

Lakeview

(see Prize under lead)

Last Chance (180)

(see under silver)

Launa

(see Leuena under silver)

Lead Horse (2)

(see under lead)

Leadville (27)

(see under gold)

Leuena (169)

(see under silver)

Lilman (119)

(see under silver)

Little Chief (120)

(see under silver)

Little Chopaka (18)

(see under lead)

Lodge

(see Dutch John under tungsten)

London

(see Methow under gold)

Lone Pine (Fuller, Pateros)

(see Fuller under iron)

Lone Pine (60)

(see under silver)

Lone Star (170)

(see under lead)

Louisa

(see Standard and Louisa under gold)

Lucky Jim (142)

Loc: Near SE. cor. sec. 7, (35-20E), Winthrop area. **Owner:** Methow Gold & Copper Mining Co. (1917). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, pyrrhotite. **Deposit:** Irregular quartz-calcite vein in agglomerate or graywacke. 10 tons of ore on dump consists of irregular bunches of ore minerals in the gangue. **Dev:** 400-ft. adit now caved and 2 other caved adits. **Assays:** Ore on dump est. to carry 6% Cu. **Ref:** 158.

Luke

(see Molly)

Lulu

(see under silver)

MacLean

(see Roosevelt under iron)

Magnetic (77)

(see under iron)

Maid of Erin (89)

Loc: Sec. 1, (34-31E), Park City dist. **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Deposit:** 2 parallel lenticular veins of white quartz 3 ft. in max. width in mica schist. Here and there in the quartz are small lenslike bunches of pyrite and chalcopyrite. **Dev:** Open cut. **Ref:** 122, p. 102.

Malott (187)

Loc: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 22, (32-25E), NE. of Malott. **Access:** 10 mi. by road from railroad at Monse. **Owner:** Phillip Bedard and John Burns, Okanogan, Wash. (1942). **Ore:** Copper, zinc, molybdenum, nickel. **Ore min:** Pyrite, pyrrhotite, chalcopyrite, sphalerite, molybdenite. **Gangue:** Quartz, feldspar. **Deposit:** Knolls of quartz and pegmatite surrounded by granite. One zone in the pegmatite is mineralized for at least 12 ft. in length. **Dev:** 4 adits and open cuts. **Assays:** 2 channel samples, each 4 ft. long, showed 0.14% and 0.15% Mo. **Prod:** 200 to 300 lb. of sulfide ore on the dump. **Ref:** 157. 158.

Mammoth (156)

(see under silver)

Manuel**Loc:** On Aeneas Mtn. **Ore:** Copper, gold. **Ref:** 63, p. 105.**Maquae**

(see under gold)

Marguerite (174)

Loc: Sec. 30, (35-25E), Conconully dist. **Ore:** Copper, lead, silver. **Ref:** 58, p. 42.

Marshal Ney

(see under gold)

Mazama Pride (139)

(see under gold)

Mazama Queen (131)

(see under gold)

Methow (215)

(see under gold)

Mid Range (146)

(see under gold)

Midas No. 1 (28)

Loc: Sec. 24, (39-25E), Palmer Mtn. dist. **Owner:** Messrs. Nall and Retzer (1929). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, malachite. **Deposit:** Shear zone in gabbro contains chalcopyrite and pyrite. Numerous quartz veins are apparently barren. **Dev:** 30-ft. drift. **Ref:** 158.

Mikelson (56)

Loc: SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 6, (40-27E), Oroville dist. **Prop:** 1 claim. **Owner:** O. Mikelson, Oroville, Wash. (1943). **Ore:** Copper. **Ore min:** Chalcopyrite, malachite. **Deposit:** Sparsely mineralized quartz stringers in a sheared and crushed greenstone. **Dev:** 280-ft. adit, inclined shaft, open cuts. **Improv:** Cabin (1943). **Ref:** 158.

Milwaukee (216)

(see under tungsten)

Mineral Hill (112)

Loc: SW. part sec. 10 and near W. line sec. 15, (31-30E). **Access:** 4 mi. W. of Nespelem by road. **Owner:** Multnomah Mining Co. (1907-1922). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite. **Gangue:** Lime silicate. **Deposit:** Small sedimentary xenoliths in granite. Contact metamorphosed similarly to those of Modoc. In addition, granite contains disseminated chalcopyrite and pyrite. **Dev:** Pits. **Ref:** 122, p. 83.

Mineral Hill (Washington Consolidated, Seven Devils) (162)

(see under silver)

Mineralite (213)

(see under tungsten)

Minnie (196)

(see under gold)

Modoc (104)

Loc: Sec. 9, (31-30E), Nespelem dist. **Owner:** A. H. Bonner and associates, Nespelem, Wash. (1949). **Ore:** Copper, gold, silver, zinc. **Gangue:** Lime silicate minerals. **Deposit:** Metasediments in contact with granite. **Dev:** 40-ft. shaft (1913). **Ref:** 68, p. 14. 122, pp. 82-83.

Mohawk

(see under lead)

Molly (Luke) (136)

Loc: NW $\frac{1}{4}$ sec 20, (36-20E), near Goat Cr. road. **Elev:** 3,000 to 3,500 ft. **Access:** 3 $\frac{1}{2}$ mi. from Mazama on Goat Cr. road. **Prop:** 5 unpatented claims. **Owner:** S. W. Shafer, Winthrop, Wash., leasing to Leybold & Scales, Inc., Tacoma, Wash. (1949). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, molybdenite, specularite, chalcopyrite, malachite, azurite, bornite. **Gangue:** Quartz. **Deposit:** Sulfides occur along fractures in an altered and fractured volcanic rock. Ore tenor is low. **Dev:** 70-ft. adit, 65-ft. adit, 45-ft. adit, and about 20 open cuts and bulldozed trenches. **Improv:** Cabin, tool shed (1949). **Ref:** 68, p. 12. 158.

Moncosilgo (Adams) (51)

Loc: NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, (40-27E), about 1 mi. NW. of Oroville. **Elev:** 1,650 ft. **Access:** 2 mi. by road from railroad at Oroville. **Prop:** 120 acres deeded land. **Owner:** C. S. Adams, W. J. Ripley, J. E. Stuibler, Oroville, Wash. (1943). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, cuprite, pyrite, pyrrhotite, native copper, molybdenite, scheelite. **Gangue:** Quartz, calcite. **Deposit:** Disseminations and small veinlets in silicified bands in diorite. Mineralized zone exposed for 200 ft. along strike. **Dev:** 56-ft. adit, 10-ft. drift, open cuts. **Assays:** Tr. to 0.05 oz. Au, 0.10 to 2.32 oz. Ag, 0.51% to 10.6% Cu. No commercial W. **Ref:** 37, p. 31. 157.

Monitor (163)

(see under lead)

Montana (135)

Loc: Near center sec. 16, (36-20E), Mazama dist. **Elev:** 5,000 to 5,500 ft. **Access:** About 2 mi. by trail up Montana Cr. from Goat Cr. road. **Prop:** 1 claim: Montana. **Owner:** Henry and Homer Peters, Winthrop, Wash. (1944). Probably abandoned (1946). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite, arsenopyrite, pyrrhotite. **Deposit:** Mineralized quartz vein in siliceous diorite country rock. **Dev:** 85-ft. adit and 2 caved adits, one of which may be 400 to 500 ft. long. **Improv:** Several old buildings, mill building, 4 stamps, crusher, and rolls (1946). **Prod:** 1915. **Ref:** 97, 1915, p. 571. 158.

Monterey (78)

Loc: NW $\frac{1}{4}$ sec. 24, (40-30E), Myers Cr. dist. **Prop:** 6 patented claims. **Owner:** Monterey Gold Mining Co. (1902-1907).

Ore: Copper, iron, gold, silver, lead. **Ore min:** Chalcopyrite, pyrite, magnetite, galena. **Gangue:** Garnet, epidote, sericite, chlorite. **Deposit:** Irregular contact metamorphic ore bodies in metasedimentary rocks, near their contact with syenite. **Dev:** 800-ft. adit, 65-ft. shaft. **Assays:** Best ore yielded \$50 to \$80 per ton. **Ref:** 88, p. 27. 133, 1907, p. 821. 154, pp. 46-47.

Montgomery

(see Tonasket)

Mother Lode

(see Crystal Butte under gold)

Mountain Beaver (5)

(see under gold)

Mountain Boy (92)

(see under lead)

Multnomah (105)

Loc: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 9, (31-30E). **Elev:** 3,000 ft. **Access:** 5 mi. by road NW. of Nespelem. **Prop:** 10 claims. **Owner:** Columbia Consolidated Mines Co. (1924-1926). Multnomah Mining Co. (1907-1922). **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopyrite, pyrite, unidentified black sulfide. **Gangue:** Quartz, fluorite. **Deposit:** Mineralized xenoliths of sedimentary rock and a 1- to 12-in. quartz vein in granite. **Dev:** 1,220-ft. adit. **Assays:** \$5 to \$50 in Au, Ag, Cu, Pb. **Ref:** 33, 1907, p. 838. 88, p. 34. 98, 1918-1926. 105, 1908, p. 761. 112, p. 193. 122, pp. 78-79.

Myers Creek (79)

(see under iron)

Myrtle

(see St. Paul under silver)

Neutral

(see Magnetic under iron)

Nevada (175)

(see under silver)

New Deal

(see Antimony Queen under antimony)

New Hope (1)

Loc: W $\frac{1}{2}$ sec. 19, (38-18E), on E. side of Buckskin Ridge, in Pasayten R. drainage, near Harts Pass. **Access:** 7 mi. by trail from road at Harts Pass. **Prop:** 7 claims. **Owner:** R. C. Matney, Prosser, Wash., and R. A. Morgan, Portland, Ore. (1951). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrrhotite. **Deposit:** 2 lenticular quartz veins in metamorphic rocks near granite. **Dev:** 3 open cuts. **Assays:** Less than 1% Cu, low values in Au, Ag. **Ref:** 157. 158.

New London

(see Methow under gold)

New York

(see under gold)

New York

(see Chicago and New York under gold)

Nina Lu (121)

(see under silver)

Nip and Tuck (80)

Loc: NE $\frac{1}{4}$ sec. 23, (40-30E), Myers Cr. dist. **Owner:** John N. Evans, Bolster, Wash. (1911). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Body of ore more than 10 ft. wide with neither wall exposed consists almost entirely of pyrite and chalcopyrite. **Dev:** Prospect pit. **Assays:** Said to assay \$32 Cu, Au, Ag. **Ref:** 154, p. 47.

Number Nine (81)

(see also Magnetic under iron)

Loc: NW¼ sec. 24, (40-30E), Myers Cr. dist. **Prop:** 1 claim of Magnetic property. **Owner:** Magnetic Mining Co., Colville, Wash. (1949). **Ore:** Copper, iron. **Ore min:** Pyrite, chalcopyrite, magnetite. **Gangue:** Garnet, epidote, calcite, quartz, actinolite, tremolite, diopside. **Deposit:** Small quantities of ore minerals in a contact metamorphic zone near intrusive syenite. **Ref:** 68, p. 12. 154, pp. 47-48.

Number One (19)

(see under lead)

O. K. (57)

Loc: Near center sec. 6, (40-27E), 4 mi. N. of Oroville. **Elev:** 1,500 ft. **Access:** 1 mi. SW. of U. S. Customs depot by road. 4 mi. from railroad. **Prop:** 3 claims and 2 fractions. **Owner:** Al Hagelberge, Oroville, Wash. (1943). Oroville Copper Co. (1921-1924). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, bornite, tetrahedrite, pyrite, molybdenite, scheelite. **Deposit:** Fracture zone more than 5 ft. wide in which are mineralized quartz stringers and lenses up to 4 ft. wide. **Dev:** 2 adits, one 520 ft. long with 120 ft. of drifts, a 60-ft. and a 20-ft. inclined shaft, and numerous open cuts. **Assays:** 7% Cu, 6 oz. Ag, \$2.00 Au from shipments. No commercial W. **Prod:** 3 cars of ore prior to 1911. 19 cars of ore shipped between 1917 and 1921. **Ref:** 37, pp. 31-32. 64, p. 85. 97, 1915, 1916, 1918. 98, 1922, p. 1660; 1925, p. 1827. 129, pp. 244-245. 157. 158.

Ohio (58)

Loc: Sec. 5, (40-27E), just S. of the international boundary, Oroville dist. **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, malachite, azurite, chrysocolla. **Deposit:** Copper minerals sparsely disseminated in greenstone. **Ref:** 154, pp. 88-89.

Okanogan Copper (150)

(see under gold)

Old Glory (96)

Loc: SW¼NE¼ sec. 15, (33-31E), Park City dist. **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopyrite. **Deposit:** Schist and argillite cut by small quartz veinlets which are sparsely mineralized. In places lenses of massive granular pyrite 1 ft. or less in thickness occur. **Dev:** 140-ft. adit. **Ref:** 58, p. 50. 122, p. 101.

Olentangy (68)

(see under gold)

Opal

(see under lead)

Orient

(see under gold)

Oriental and Central

(see American Flag under gold)

Osiola**Loc:** Squaw Cr. dist. **Ore:** Copper, gold. **Ref:** 63, p. 89.**Palmer (186)**

Loc: Sec. 20, (34-26E). **Access:** 5 mi. from railroad at Omak. **Ore:** Copper. **Ore min:** Tetrahedrite, pyrite. **Deposit:** Mineralized breccia zone in granite. **Ref:** 111, p. 5.

Palmer Lake (50)

Loc: SE¼ sec. 36, (40-26E), well up on the valley side NE. of Palmer Lk. **Prop:** 5 claims. **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopyrite, bornite. **Deposit:** 2- to 3½-ft. vein of massive quartz carrying small amounts of ore minerals. **Ref:** 154, p. 101.

Palmer Mountain Tunnel (37)

(see under gold)

Palmer Summit (29)

(see under gold)

Panama (124)

(see under silver)

Parallel

(see under gold)

Pateros (Fuller, Lone Pine)

(see Fuller under iron)

Pateros

(see Sullivan under gold)

Pay Day (148)

(see under gold)

Peacock (Bornite) (6)

Loc: NW¼ sec. 10, (38-20E), on SW. slope of Billy Goat Mtn. **Elev:** 6,500 to 6,800 ft. **Access:** About 3 mi. by trail from end of the Eightmile Cr. road. **Prop:** 1 unpatented claim. **Owner:** Charles Kenney, Winthrop, Wash. (1946). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite, secondary copper minerals. **Gangue:** Quartz, calcite, barite. **Deposit:** A fairly well mineralized fracture zone 2 to 5 ft. wide in volcanic rock. **Dev:** 60-ft. drift. **Assays:** Specimen of vein material assayed 0.025 oz. Au, 4.65 oz. Ag, 3.14% Cu. **Ref:** 158.

Peacock (176)

(see under silver)

Peerless (10)

(see also Little Chopaka, Worthington under chromium)

Loc: SE¼ sec. 16 and W½ sec. 22, (40-25E), on S. face of Little Chopaka Mtn., Nighthawk dist. **Prop:** 20 claims, which probably include the Little Chopaka (Defense) and Worthington properties. **Owner:** Peerless Mining, Milling & Smelting Co. (1935). **Ore:** Copper, chromium. **Ore min:** Magnetite, pyrite, chalcopyrite, chromite, pyrrhotite. **Gangue:** Garnet, epidote. **Deposit:** Quartzite, argillite, and greenstone mineralized in places. No well-defined vein. Serpentinized peridotite cutting these rocks carries a little chromite. **Dev:** Several adits and shafts, one adit 400 ft. long. **Ref:** 40, p. 6. 105, no. 16, 1909, p. 541. 154, p. 93. 158.

Peoria (193)

(see under gold)

Phil Sheridan

(see Sheridan under copper)

Pinnacle (30)

(see under gold)

Pittsburg (116)

(see under silver)

Plant-Callahan (181)

(see under silver)

Prize (21)

(see under lead)

Pthomigan

(see under cobalt)

Pyrargyrite

(see Ruby under silver)

Q. S. (152)

Loc: N½ sec. 27, (37-25E), on steep mountain slope E. of Blue Lk. **Elev:** 2,000 to 3,500 ft. **Access:** 12 mi. by road N. of Conconully. **Prop:** 24 claims. **Owner:** Q. S. Copper Co. (1915-

1926). Q. S. Gold Mining & Smelting Co. (1902-1918). Q. S. Mining Co. (1920). **Ore:** Copper, gold, silver. **Ore min:** Chalcocopyrite, pyrite. **Deposit:** Metamorphic rocks intruded by diorite dikes contain sparsely disseminated ore minerals. **Dev:** 1,060-ft. crosscut, 600-ft. crosscut. **Assays:** 40 ft. of one mineralized zone said to av. 2½% Cu, but deposit as a whole av. less than 1% Cu, and only tr. Au, Ag. Some surface ore ran \$37 Au. **Ref:** 33, 1907, p. 943; 1908, p. 1144. 75, pp. 34-35. 88, pp. 32-33. 91, p. 249. 97, 1907, p. 475. 98, 1918-1926. 114, no. 5, 1909, pp. 80-81.

Rainbow (31)
(see under gold)

Ramore (98)
(see under lead)

Ramsey (101)
Loc: Sec. 33, (32-30E). **Access:** 5 mi. NW. of Nespelem and about 1 mi. N. of the Nespelem-Omak road. **Owner:** Columbia Consolidated Mines Co. (1924). Multnomah Mining Co. (1907-1922). Multnomah Mining, Milling & Development Co. (1915). **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite, magnetite, pyrite, specularite. **Gangue:** Vesuvianite, hornblende. **Deposit:** Argillite and schist surrounded and metamorphosed by granite. **Dev:** Several shafts to depths of at least 40 ft., and a 100-ft. adit. **Assays:** Sample selected from one of the dumps assayed 2.16 oz. Ag, tr. Au, 5.15% Cu. **Ref:** 122, p. 82. 158.

Rattlesnake (192)
(see under gold)

Rebecca (128)
Loc: Near SE. cor. sec. 32, (30-31E), Nespelem dist. **Access:** 3 mi. E. of Barry by road. **Owner:** Rebecca Mining Co. (1921-1926). **Ore:** Copper, silver, zinc. **Ore min:** Pyrrhotite, chalcocopyrite, sphalerite, magnetite. **Gangue:** Epidote, vesuvianite, other lime silicate minerals. **Deposit:** Contact-metamorphosed pendant of argillite and limestone ½ mi. long and 500 ft. wide in granite. **Dev:** Several hundred feet of workings in 3 shafts and 2 adits, also open cuts. **Assays:** Representative sample from one of richest-looking dumps assayed 2.68 oz. Ag, tr. Au, 5.15% Cu. No assay made for Zn, which is commonly present but less in amount than Cu. **Ref:** 46, pp. 192-193. 98, 1922-1926. 100, 1900, p. 81. 122, p. 80. 129, pp. 216-217.

Reco (66)
(see under gold)

Red Bird (126)
Loc: Sec. 36, (31-31E). **Access:** 7 mi. SW. of Nespelem. **Ore:** Copper, silver, zinc. **Ore min:** Magnetite, chalcocopyrite, pyrite, sphalerite. **Gangue:** Vesuvianite, red and green garnet. **Deposit:** Limy argillite and impure limestone surrounded and metamorphosed by granite. **Dev:** Shaft. **Assays:** A fairly representative sample from one of the dumps assayed 1.2 oz. Ag, 1.9% Cu. **Ref:** 122, p. 81.

Red Shirt (194)
(see under gold)

Reedy
(see Antimony Queen under antimony)

Republic (177)
(see under lead)

Review (67)
(see under gold)

Rich Bar (59)
Loc: Approx. in W½ sec. 11, (40-26E), on Similkameen R. about 5 mi. E. of Nighthawk. **Prop:** 7 patented claims (1955).

Owner: S. J. Lewen, Curtice, Ohio (1955—). Rich Bar Mining Co. (1911-1915). **Ore:** Copper, zinc, silver, lead. **Ore min:** Chalcocopyrite, sphalerite, pyrite, stephanite, galena, argentite in order of decreasing importance. **Gangue:** Quartz. **Deposit:** Lode varies from stringers to a 6-ft. vein of mineralized quartz enclosed in quartzitic slate. **Dev:** Two shafts, deeper one 150 ft. deep with drifts from the 50- and 150-ft. levels. **Assays:** From tr. to \$40 per ton. Richer ore seems to occur in center of the lode. **Ref:** 46, p. 223. 154, pp. 95-96.

Rock House
(see under gold)

Roosevelt (74)
(see under iron)

Roosevelt (217)
(see under gold)

Rosalind (132)
(see under gold)

Ruby
(see under silver)

Ruby (11)
(see under silver)

Russia
Loc: Okanogan County. **Owner:** Hillcrest Copper Co. (1918). **Ore:** Copper, gold, silver. **Ref:** 112, p. 182.

Safe Deposit
Loc: Twisp dist. **Ore:** Copper, gold, silver. **Ref:** 63, p. 86.

St. Anthony (201)
(see under gold)

St. Lawrence
(see under gold)

St. Paul (122)
(see under silver)

Salmon River (164)
(see under silver)

Schoenfeld
(see Floyd)

Schulz and Chesney (221)
(see under gold)

Sections 4 and 9 (106)
Loc: W. part sec. 9 and SW¼ sec. 4, (31-30E). **Access:** Nespelem-Omak highway passes within 1½ mi. of the occurrence. **Ore:** Copper (?) **Deposit:** Mineralization and alteration similar to that of Home Run and Modoc. **Dev:** Prospect pits. **Ref:** 122, p. 83.

Security (39)
Loc: SW¼ sec. 36, (39-25E), halfway between Loomis and the Pinnacle mine, Palmer Mtn. dist. **Ore:** Copper, lead, zinc, gold. **Ore min:** Pyrite, chalcocopyrite, galena, sphalerite, reportedly free gold. **Gangue:** Quartz. **Deposit:** Shear zone in argillite carries a vein 70 ft. long and 0 to 3 ft. wide. It is sparsely mineralized. A similar vein occurs in the upper adit. **Dev:** 620-ft. adit, 200-ft. adit. **Prod:** Has produced. **Ref:** 100, vol. 11, 1903, p. 56; vol. 12, 1903, p. 103. 158.

Seven Devils
(see Mineral Hill under silver)

Sharp
(see Silver King)

Shaw-Bergman (83A)

Loc: NW¼ sec. 8, (39-29E), on Shaw's farm. **Elev:** 4,300 ft. **Access:** Road. **Prop:** Deeded land. **Owner:** Greg Collins and Axel Bergman, Seattle, Wash. (1953—). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Ore minerals sparsely disseminated in schist across width of 3 ft. **Dev:** Open cut. **Assays:** About \$25 Au, Ag. **Ref:** 158.

Sheridan (85)

(see under copper)

Sherwood

(see Dutch John under tungsten)

Sidewinder

(see under gold)

Silver Belle

(see under silver)

Silver Bluff

(see under silver)

Silver Cliff (127)

(see under silver)

Silver King (Bunker Hill) (165)

(see under lead)

Silver King (Sharp) (140)

Loc: NW¼ sec. 29, (36-20E). **Elev:** 2,700 to 3,000 ft. **Access:** About 3 mi. by the Goat Cr. road from Mazama. **Prop:** 7 unpatented claims. **Owner:** Alva Sharp, Mazama, Wash. (1949). **Ore:** Copper, gold, silver, lead. **Ore min:** Pyrite, chalcopyrite, galena. **Gangue:** Quartz, calcite. **Deposit:** Altered volcanic or granitic rock cut by at least 2 fracture zones in which are 2 mineralized quartz-calcite veins from 2 to 14 in. thick. **Dev:** 155-ft. adit, 55-ft. adit, and several open cuts. **Improv:** Cabin (1949). **Assays:** 12 in. of vein material reportedly assayed \$7.00 Au. **Ref:** 68, p. 15. 158.

Silver Point (110)

Loc: NE¼SW¼ sec. 17, (31-30E), Nespelam dist. **Owner:** Joe Ott, Nespelam, Wash. (1939). **Ore:** Copper, lead. **Ore min:** Chalcopyrite, galena, pyrite. **Deposit:** Mineralized quartz stringers in metamorphic rock near intrusive granite. **Dev:** 2 adits. **Ref:** 158.

Silver Seal

(see Antimony Queen under antimony)

Silver Tip

(see Starr under molybdenum)

Six Eagles

(see Little Chopaka under lead)

Snow Cap

(see Iron Cap and Snow Cap under gold)

Sonny Boy (184)

(see under silver)

Sooner (133)

Loc: Sec. 17, (36-20E). **Elev:** 3,500 ft. **Access:** About 4 mi. from Mazama by the Goat Cr. road. **Prop:** 2 unpatented claims. **Owner:** The late Tom C. Luke, Mazama, Wash. (1946). **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Gangue:** Quartz, calcite. **Deposit:** Several fracture zones in diorite containing stringers of mineralized quartz and calcite. **Dev:** Caved shaft, reportedly 100 ft. deep, adit caved at the portal, and 4 or 5 open cuts. **Ref:** 158.

Spokane (American Rand) (47)

(see under gold)

Spokane (Gold Crown) (188)

(see under gold)

Standard and Louisa (212)

(see under gold)

Star

(see Lone Star under lead)

Starr (153)

(see under molybdenum)

Stone

(see Kelsey)

Submarine

(see Lone Pine under silver)

Sullivan

(see under gold)

Summit (93)

(see under lead)

Summit (20)

(see under silver)

Sunrise

(see under silver)

Sunshine

(see Hidden Treasure under gold)

Sunshine Chief

(see Chief Sunshine under silver)

Swayne (141)

Loc: Sec. 13, (36-19E), secs. 19, 20, and 30, (36-20E), Mazama dist. **Owner:** Everett Swayne, Mazama, Wash. (1951). **Ore:** Copper, molybdenum, antimony. **Ref:** 150, p. 40.

Teddy Roosevelt

(see Roosevelt under iron)

Texas Creek

(see Dutch John under tungsten)

Three Links

(see under gold)

Tip Top (Jupiter) (123)

Loc: SW¼ sec. 22 and NW¼ sec. 27, (31-30E), near crest of SE. spur of Mineral Hill, Nespelam dist. **Access:** ¼ mi. NW. of Cabin workings. **Prop:** 1 claim. **Ore:** Copper, lead, zinc. **Ore min:** Chalcopyrite, pyrite, marcasite, galena, sphalerite. **Gangue:** Quartz, calcite. **Deposit:** Numerous small mineralized quartz stringers in a shear zone in granite. Some mineralization in nearby metamorphic rocks. **Dev:** 100-ft. shaft, 80-ft. incline. **Ref:** 129, pp. 215-216. 158.

Tom Hal

(see Friday under gold)

Tomlinson

Loc: On Methow R. in Methow dist. **Owner:** D. W. Tomlinson, Mansfield, Wash. (1941). **Ore:** Copper, lead, zinc. **Ref:** 46, p. 200.

Tonasket (Montgomery, Fluorspar) (155)

Loc: Near NE. cor. sec. 12, (36-26E), 6 mi. S. of Tonasket and 1 mi. W. of the Okanogan R. **Prop:** 6 claims. **Owner:** H. H. Montgomery (1939). **Ore:** Copper, tungsten, lead, silver. **Ore min:** Pyrite, chalcopyrite, molybdenite, huebnerite, tungstite, galena. **Gangue:** Quartz, fluorite. **Deposit:** Schistose calcareous argillite carrying disseminated pyrite. Also some quartz veins carrying pyrite, galena, and chalcopyrite. A limy band contains fluorite. **Dev:** 200-ft. adit, several open cuts. **Assays:** Huebnerite reported to constitute 5% of the vein filling at one

place. Ore shows \$1 to \$2 Au, Ag. **Ref:** 54, pp. 23-24. 130, p. 90. 158.

Tough Nut (166)
(see under silver)

Triangle
(see Hidden Treasure under gold)

Trinidad
(see Central under silver)

Triune (48)
(see under gold)

Twin Pine (107)
(see under zinc)

Twisp View (189)
(see under gold)

Utica (35)
(see under gold)

War Eagle (40)
(see under gold)

War Eagle
(see under silver)

Wasco (95)
(see under silver)

Washington (218)
(see under gold)

Washington Consolidated
(see Mineral Hill under silver)

Western Star (82)
Loc: NW $\frac{1}{4}$ sec. 24, (40-30E), Myers Cr. dist. **Ore:** Copper, gold, silver. **Deposit:** Mineralized shear zone in metamorphic rocks near intrusive granite. Reportedly 10 to 15 ft. of ore exposed. **Dev:** Short adit. **Assays:** Reportedly 8% to 10% copper and several dollars in gold and silver in the ore shipped. **Prod:** Few cars shipped 1914-1915. **Ref:** 54, p. 8. 97, 1914, p. 651; 1915, p. 572.

Windiate-Auberton (87)
(see under tungsten)

Windsor
(see Detroit-Windsor under gold)

Wolverine (149)
(see under gold)

Woo Loo Moo Loo (185)
(see under silver)

Wyoming (178)
(see also Peacock under silver)

Loc: Sec. 30, (35-25E), Conconully dist. **Prop:** 1 claim of Peacock group. **Ore:** Copper, lead, silver. **Ref:** 58, p. 74.

Yakima (69)
Loc: NW $\frac{1}{4}$ sec. 21, (40-30E), Myers Cr. dist. **Owner:** Yakima Gold Mining Co. (1908-1915). Yakima Mining & Milling Co. (1902). **Ore:** Copper, gold, silver, lead, zinc. **Ore min:** Chalcopryrite, galena, sphalerite, pyrite. **Gangue:** Serpentine. **Deposit:** Sulfides disseminated and in veins a few in. to 6 ft. wide in serpentine. **Prod:** 1908. **Ref:** 88, p. 27. 97, 1908, p. 579.

Yellow Girl
Loc: Conconully dist. **Ore:** Copper, silver, gold. **Ref:** 112, p. 211.

PEND OREILLE COUNTY

Abraham-Huff (20)

Loc: Sec. 24, (34-44E), on S. shore of Browns Lk., Newport dist. **Prop:** 1 claim. **Owner:** J. C. Huff and W. W. Abraham. **Ore:** Copper. **Ore min:** Chalcopryrite, chalcocite, bornite, pyrite. **Gangue:** Quartz. **Deposit:** Faulted and brecciated zone in argillaceous sandstone. Zone is 2 to 3 ft. wide and has numerous mineralized quartz veinlets about $\frac{1}{4}$ in. wide. **Dev:** 20-ft. and 75-ft. adits and an adit with water-filled winze at 50 ft. **Ref:** 139, p. 39.

Ace High (9)
(see under silver)

Ackerlund (24)

Loc: SW $\frac{1}{4}$ sec. 13, (33-44E), in saddle on top of ridge, Newport dist. **Elev:** 3,400 ft. **Access:** Near road. About 6 mi. from Usk. **Prop:** 240 acres deeded land. **Owner:** G. S. Ackerlund, Newport, Wash. (1948). **Ore:** Copper, zinc. **Ore min:** Chalcopryrite, pyrite, sphalerite. **Gangue:** Quartz, calcite. **Deposit:** 0 to 18-in. sparsely mineralized quartz vein in argillite. **Dev:** Caved adit and water-filled incline, totaling about 100 ft. **Assays:** 3 samples from widths of 1 to 4 ft. showed 0.06% to 0.49% Cu, 0.30% to 0.60% Zn, tr. Au, 0.20 to 0.25 oz. Ag. **Ref:** 139, p. 39. 157.

Alger and McCullough (32)

(see also Fair Hope under copper, Key Fraction under lead, and Meteor under silver)

Loc: SE $\frac{1}{4}$ sec. 15 and NE $\frac{1}{4}$ sec. 22, (32-45E), Newport dist. **Access:** Road. **Prop:** Several claims, including Fair Hope, Key Fraction, Meteor. **Ore:** Copper, lead, silver. **Ore min:** Galena, chalcopryrite, arsenopryrite. **Gangue:** Quartz, calcite, siderite, serpentized diorite. **Deposit:** Ore minerals in bunches in irregular branching veins and stringers. **Ref:** 73, pp. 44-46. 130, p. 80.

Baker City (33)
(see under silver)

Bead Lake (34)
(see under lead)

Best Chance
(see Rainbow)

Blue Jim (15)
(see under silver)

Bornite (Holneck) (42)

Loc: Near SW. cor. sec. 35, (32-45E), on NE. side of Pend Oreille R. **Access:** 4 mi. from Newport by road. **Prop:** Approx. 220 acres of deeded land. **Owner:** W. H. Weston, Spokane, Wash. (1941). **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopryrite, bornite, malachite. **Deposit:** Mineralized quartz veins from 1 to 2 ft. in width along shear zones in quartzite and argillite near intrusive diorite. **Dev:** 470-ft. adit with 100-ft. and 180-ft. drifts, a 200-ft. adit, and an inclined shaft. **Ref:** 29, pp. 67-68. 139, p. 43.

Box Canyon (16)

Loc: Sec. 20, (38-43E), about 500 ft. N. of the N. end of the bridge at Box Canyon. **Ore:** Copper. **Ore min:** Chalcopryrite. **Gangue:** Diopside, limestone. **Deposit:** 3 parallel fractures in limestone about 2 ft. apart are weakly mineralized. **Dev:** 4 open pits. **Ref:** 158.

Bromide
(see La Sota under silver)

Calispell (26)

Loc: SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, (33-45E), Newport dist. **Access:** Road. **Prop:** 2 unpatented claims. **Owner:** Jack Gallagher and

associates, Newport, Wash. (1941-1948). E. M. Cook (1893). **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** Mineralized quartz vein 4 to 6 ft. wide. **Dev:** 2 adits about 500 and 300 ft. long, now caved (1950). **Prod:** Some production reported. **Ref:** 29, p. 70. 139, p. 43.

Campbell (Star) (28)

Loc: Sec. 23, (32-45E), Newport dist. **Access:** ½ mi. from road. **Prop:** 3 patented claims: Hawkeye, Gray Eagle, Last Chance. **Owner:** V. P. Campbell, Spokane, Wash. (1941). **Ore:** Copper, lead, silver, gold. **Deposit:** Mineralized quartz vein 6 ft. wide. **Dev:** 450 ft. of shaft and adit, all caved. **Ref:** 29, pp. 66, 71.

Champagne-Hoosier

(see Hoosier)

Comstock (35)

(see under lead)

Conquest

(see Kootenai Conquest under lead)

Copper Hill

Loc: Newport dist. **Owner:** Lone Star Copper Mining Co. (1918-1924). **Ore:** Copper. **Ref:** 58, p. 16. 98, 1918-1925.

Copper Queen (11)

Loc: Sec. 20, (39-43E), Metaline dist. **Access:** Road. **Prop:** 80 acres of patented land. **Owner:** Messrs. Troyer and Davenport, Newport, Wash. (1941). **Ore:** Copper. **Ore min:** Malachite. **Deposit:** Mineralized fracture zone in schist. **Dev:** 40-ft. adit. **Ref:** 29, p. 52.

Copper Queen (1)

Loc: Secs. 27 and 28, (40-43E), Metaline dist. **Access:** ¼ mi. from road. **Prop:** 3 unpatented claims. **Owner:** Tom Buckingham, Metaline, Wash. (1941). **Ore:** Copper, gold, silver. **Deposit:** Fracture zone in slate contains narrow mineralized quartz stringers. **Dev:** Open cuts, stripping. **Ref:** 29, p. 46.

Cougar (8)

Loc: Sec. 25, (39-44E), Metaline dist. **Access:** ½ mi. from road. **Prop:** 8 unpatented claims. **Owner:** Emil Reuther estate, Metaline Falls, Wash. (1948). **Ore:** Copper, lead, silver, gold. **Deposit:** Quartz vein as much as 4 ft. wide is sparsely mineralized. **Dev:** 800 ft. of adit. **Improv:** 2 cabins. **Ref:** 29, p. 34. 52, p. 7.

Eagle

(see Ries under lead)

Fair Hope (36)

(see also Alger and McCullough)

Loc: NE¼ sec. 22, (32-45E), Newport dist. **Access:** 8 mi. by road from railroad at Newport. **Prop:** 1 claim, part of Alger and McCullough group. **Owner:** Ed Alger, Newport, Wash. (1941). **Ore:** Copper. **Ore min:** Chalcopyrite, arsenopyrite. **Deposit:** Quartz veins in serpentinized diorite. **Dev:** 160-ft. adit. **Ref:** 73, pp. 45-46.

Fairview Copper

(see Skippy and Queen Bess under lead)

Fissure

(see under silver)

Flusey

(see Flusey-Hoopala under lead)

Flusey-Hoopala (2)

(see under lead)

General MacArthur (43)

(see under lead)

Glass

(see General MacArthur under lead)

Gold Arrow

(see Ries under lead)

Gold Coin-Hardtack (37)

(see under silver)

Golden Anchor

(see Ries under lead)

Grandview (Reuther) (6)

(see under silver)

Gray Eagle

(see Hawkeye-Gray Eagle-Last Chance)

Gypsy (7)

Loc: Secs. 17 and 18, (39-45E), Metaline dist. **Access:** Road. **Prop:** 10 unpatented claims. **Owner:** Formerly Frank Gramm, Colville, Wash., but believed abandoned (1941). **Ore:** Copper, gold, silver. **Deposit:** Mineralized quartz vein from a few in. to 4 ft. in width. **Dev:** 600 ft. of adits, partly caved. **Ref:** 29, p. 38.

Hansen (48)

(see under gold)

Hardrock Thomas (22)

Loc: SE¼SW¼ sec. 2, (33-44E), Newport dist. **Access:** Road. **Prop:** 2 patented claims. **Owner:** Richard Cunningham, Spokane, Wash. (1941-1948). **Ore:** Copper, silver, gold, tungsten. **Ore min:** Chalcopyrite, pyrite, scheelite. **Gangue:** Quartz, barite. **Deposit:** Mineralized quartz veins from a few in. to 6 ft. in width. **Dev:** 400 ft. of adits, numerous open cuts. **Ref:** 29, p. 69. 139, p. 44.

Hardtack

(see Gold Coin-Hardtack under silver)

Hawkeye-Gray Eagle-Last Chance (29)

Loc: SE¼ sec. 23, (32-45E), Newport dist. **Access:** 1,000 ft. from end of road at Marshall Lk. **Prop:** 2 patented claims and 1 unpatented claim. **Owner:** Delia Karsunky (1951). Hoover Mining Co., V. P. Campbell. **Ore:** Copper, lead, silver, gold. **Deposit:** Quartz vein. **Dev:** A caved adit about 300 ft. long has its portal in quartzite. A caved shaft. **Ref:** 29, p. 66. 139, p. 45.

Holneck

(see Bornite)

Hoosier (Champagne-Hoosier) (12)

Loc: Sec. 19 and center N½ sec. 30, (39-43E), Metaline dist. Adjoins Oriole property on SW. **Access:** 2½ mi. by road from town of Metaline Falls. **Prop:** 4 claims: Hoosier, Fairview, Champagne, Oriole West Extension. **Owner:** Pend Oreille Premier Mining Co. (1932-1941). **Ore:** Copper, gold, silver. **Ore min:** Malachite, pyrite. **Gangue:** Calcite, quartz. **Deposit:** Mineralized zone in serpentinized dolomite near its contact with quartzite. **Dev:** 175-ft. adit, 25-ft. shaft, 100-ft. adit. **Ref:** 29, p. 40. 46, pp. 36-38. 73, p. 70. 158.

Huff

(see Abraham-Huff)

Independence (30)

(see under silver)

Isabelle (21)

(see under gold)

Katydid

(see Ries under lead)

Key Fraction (38)

(see under lead)

Kootenai Conquest (39)

(see under lead)

Lakeside (31)

Loc: SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 23, (32-45E), on N. shore of Marshall Lk., Newport dist. **Elev:** At lake level. **Access:** 0.3 mi. by trail from end of road at Marshall Lk. **Prop:** 1 claim. **Owner:** W. H. Wright, Newport, Wash. (1948). **Ore:** Copper. **Ore min:** Chalcopyrite. **Gangue:** Quartz. **Dev:** A drift, caved at portal (1948). **Ref:** 139, p. 49.

La Sota (Silver Crest, Bromide) (17)

(see under silver)

Last Chance

(see Hawkeye-Gray Eagle-Last Chance)

Little Noisy (10)

(see under zinc)

Lloyd (46)

(see under lead)

McCann (23)

Loc: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, (33-44E), Newport dist. **Access:** Road. **Prop:** 80 acres of deeded land. **Owner:** M. W. McCann (1941). **Ore:** Copper, silver, gold. **Deposit:** Said to be a mineralized quartz vein which varies in width from a few in. to 4 ft. **Dev:** Adit and several open cuts, all caved. **Ref:** 29, p. 71. 139, p. 50.

McCullough

(see Alger and McCullough)

Meade (4)

(see under lead)

Meteor (40)

(see under silver)

Midas

(see Ries under lead)

Mount Pisgah (47)

(see under lead)

O. K. (14)

(see under silver)

Oriole (13)

(see under zinc)

Pindle (49)

Loc: Sec. 30, (30-43E), Newport dist. **Access:** Road. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper, lead, silver. **Deposit:** Narrow quartz stringers said to be mineralized. **Dev:** 100 ft. of adit, now caved (1941), and some open cuts. **Ref:** 29, p. 74.

Queen Bess

(see Skippy and Queen Bess under lead)

Rainbow (Best Chance) (25)

Loc: Sec. 14, (33-44E), Newport dist. **Access:** $\frac{1}{4}$ mi. from road. **Prop:** 1 unpatented claim. **Owner:** Charles Hubert, Usk, Wash. (1941). **Ore:** Copper, gold, silver. **Deposit:** Mineralized quartz veins as much as 4 ft. wide have been traced for 130 ft. in the adit. **Dev:** 130-ft. adit, caved shafts. **Improv:** Cabin (1941). **Assays:** Hand-picked samples assayed \$10, \$14, and \$22.50 per ton. **Ref:** 29, pp. 69-70.

Reidt (45)

Loc: Sec. 32, (31-45E), Newport dist. **Prop:** 160 acres of deeded land. **Owner:** Steve Reidt, Newport, Wash. (1941). **Ore:** Copper, gold. **Deposit:** Quartz stringers from a few in. to 3 ft. wide and said to carry copper and gold. **Dev:** None. **Ref:** 29, p. 72.

Reuther

(see Grandview under silver)

Reynolds Creek (18)

Loc: Sec. 25, (35-43E), Newport dist. **Access:** $1\frac{1}{2}$ mi. from road. **Prop:** 1 unpatented claim. **Owner:** Jack Gallagher and Jack Salley, Newport, Wash. (1941). **Ore:** Copper, iron. **Dev:** 60-ft. caved shaft. **Ref:** 29, p. 65.

Ries (44)

(see under lead)

Riverside (5)

(see under lead)

Rocky Creek (17A)

(see under silver)

Silver Crest

(see La Sota under silver)

Skippy and Queen Bess (19)

(see under lead)

Snowbird and Stanley (41)

(see under lead)

Snyder

(see Gold Coin-Hardtack under silver)

Stanley

(see Snowbird and Stanley under lead)

Star (Independence)

(see Independence under silver)

Star

(see Campbell)

Uncas (3)

(see under zinc)

Victory (27)

Loc: Sec. 19, (33-45E), Newport dist. **Access:** Road. **Prop:** 2 unpatented claims. **Owner:** Jack Gallagher et al., Newport, Wash. (1941). **Ore:** Copper, gold. **Deposit:** Said to be a 6-ft. quartz vein which carries values in copper and gold. **Dev:** 200 ft. of adit and shaft, caved (1941). **Ref:** 29, p. 75.

West

(see Blue Jim under silver)

PIERCE COUNTY

Blue Star

Loc: T. 18 N., R. 8 E. on Cowcowan Cr., a tributary of the Carbon R. **Access:** $6\frac{1}{2}$ mi. by trail from Fairfax. **Prop:** 14 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite. **Deposit:** 9 veins from 8 in. to 8 ft. wide occur in gneiss. **Dev:** 40-ft. adit. **Ref:** 88, pp. 91-92.

Bunny (4)

Loc: Sec. 25, (18-7E), several hundred ft. above the Surprise adit. **Owner:** Charles Stafford (1941). **Ore:** Copper. **Ore min:** Chalcopyrite. **Gangue:** Tourmaline, quartz. **Deposit:** Veinlets up to 3 in. thick. **Dev:** Caved adit (1941). **Ref:** 158.

Carbon River (2)

Loc: Reportedly 500 ft. S. of the Carbon R. road and $\frac{1}{4}$ mi. below the Mt. Rainier National Park entrance. Approx. sec. 1, (17-6E), **Ore:** Copper. **Ore min:** Chalcopyrite. **Deposit:** Reportedly a chalcopyrite-bearing vein 2 ft. thick. **Assays:** Said to be rich. **Ref:** 158.

Chicago

Loc: 9 mi. from Fairfax, a short distance from the trail leading to the Surprise property. **Prop:** 6 claims. **Owner:** Monte-

zuma Mining Co. (1901). **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** Fissure vein in diorite. **Dev:** Small amount. **Ref:** 88, p. 91.

Clipper (Mothers Day) (5)

Loc: N½NE¼ sec. 25, (18-7E), adjoining Surprise group on the SE. **Access:** Trail. **Owner:** Stanley Slejeski and Charles Zinski, Tacoma, Wash. (1943). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, arsenopyrite, malachite. **Gangue:** Quartz, tourmaline. **Deposit:** Mineralized vertical joints in granodiorite as much as 4 in. wide. **Dev:** 900-ft. adit with 3 or 4 short crosscuts. **Ref:** 88, p. 91. 158.

Copper King (9)

Loc: SE¼NE¼ sec. 19, (18-8E), ½ mi. N. of Coplay Lk. **Elev:** 4,160 ft. **Access:** Road from Fairfax. **Owner:** Lawrence Falick, Tacoma, Wash. (1941). **Ore:** Copper. **Ore min:** Malachite, pyrite. **Gangue:** Quartz, tourmaline. **Deposit:** Veinlets in granodiorite. **Dev:** 50-ft. adit, 76-ft. adit, caved adit (1941). **Prod:** Test shipment in 1918. **Ref:** 97, 1919, p. 492. 158.

East Lake (7)

Loc: ½ mi. due E. of the Surprise group. **Prop:** 6 claims. **Owner:** Washington Co-operative Mining Syndicate (1901-1907). **Ore:** Copper. **Ore min:** Chalcopyrite. **Deposit:** A number of veins in syenite. **Ref:** 33, 1907, p. 1154. 88, p. 91.

Eastlick

Loc: Carbon R. dist. **Owner:** Copper King Mining Syndicate (1907-1918). **Ore:** Copper. **Ref:** 33, 1907, p. 523. 98, 1918, p. 75.

Golden Rule (8)

(see under zinc)

Larigo

(see Tillie and Larigo)

Lone Star

Loc: Summit dist. **Ore:** Copper, gold, silver. **Ref:** 63, p. 46.

Lorraine

Loc: Carbon R. dist. **Owner:** Lorraine Copper Mining Co. (1907-1908). **Ore:** Copper, silver, gold. **Ref:** 33, 1907, p. 752; 1908, p. 888.

Mashel (1)

Loc: N½NW¼SW¼ sec. 22, (16-4E). **Access:** 2 mi. W. of Eatonville by road. **Owner:** Mr. Denman. **Ore:** Copper. **Ore min:** Native copper. **Gangue:** Altered volcanics. **Deposit:** Brownish-red altered lava with thin seams of native copper along joints. Rock exposed for ½ mi. along creek. **Prod:** Mined for copper in 1900's. Later used for paint pigment. **Ref:** 158.

Mothers Day

(see Clipper)

Mt. Rainier

(see Storbo)

New Deal

(see Washington Cascade under gold)

Silver Creek (12)

(see under gold)

Silver Creek Gold & Lead (11)

(see under gold)

Storbo (Mt. Rainier) (10)

Loc: Approx. sec. 8, (16-9E), at head of Inter Fk. of White R. on N. side of Mt. Rainier. **Access:** Trail. **Owner:** Mount Rainier Mining Co., Inc., Seattle, Wash. (1916—). **Ore:** Copper. **Ore min:** Chalcopyrite. **Gangue:** Tourmaline. **Deposit:**

Lenticularly and intermittently mineralized fractures in Keechelus andesite up to 1 ft. thick. **Dev:** 7 adits totaling about 1,500 ft. of workings. **Improv:** 1 cabin (1952). **Prod:** 1915-1917, 1926, 1928. **Ref:** 68, p. 12. 97, 1915-1917, 1926, 1928. 158.

Surprise (6)

Loc: N½NE¼ sec. 25, (18-7E), on E. side of Old Baldy Mtn. halfway between Coplay and Summit Lakes, Carbon R. dist. **Elev:** 4,000 ft. **Access:** Trail up Cayada Cr. from Carbon R. road. **Prop:** 13 claims, including Surprise and Hog Back. **Owner:** C. T. Stafford, Tacoma, Wash. (1943). A. B. Crain (1941). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Tourmaline, quartz. **Deposit:** Joint planes in granodiorite have been hydrothermally altered and mineralized. Mineralized portions range in width from 2 to 12 in. **Dev:** 465-ft. adit with 2 short raises. **Prod:** Test shipment in 1919. **Ref:** 88, pp. 90-91. 158.

Tacoma

(see also Washington Cascade under gold)

Loc: On Mowich R., 17 mi. by trail SE. of Fairfax, Carbon R. dist. **Access:** Trail. **Prop:** 4 claims. **Owner:** Blue Bell Gold Mining Co., Tacoma, Wash. (1938). Washington Co-operative Mining Syndicate (1901-1907). Washington Cascade Mining Co., Tacoma, Wash. (1938). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite. **Gangue:** Calcite. **Deposit:** Mineralized zone 25 ft. wide contains disseminated chalcopyrite. Also a rich streak 3 ft. wide along the footwall. **Dev:** 200-ft. drift with 5 crosscuts aggregating 100 ft. **Assays:** Said to carry 5% to 33% Cu, \$2 Au, \$3.50 Ag. **Prod:** Test shipments about 1900. **Ref:** 33, 1907, p. 1154. 88, p. 92. 158.

Tillie and Larigo (3)

Loc: Sec. 33, (18-7E), across Carbon R. from Mt. Rainier National Park entrance. **Elev:** 300 ft. above valley floor. **Owner:** L. Falick (1941). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Veinlets of sulfides less than ½ in. wide cut granodiorite. **Ref:** 158.

Vanguard

Loc: Eatonville area. **Ore:** Copper. **Ref:** 63, p. 46. 169, pp. 41-42.

Washington Cascade (13)

(see under gold)

Washington-Wonder

Loc: Fairfax area. **Ore:** Copper. **Prod:** Development ore shipped in 1910. **Ref:** 97, 1910, p. 604.

Wonder

(see Washington-Wonder)

SKAGIT COUNTY

Anacopper (1)

Loc: 3½ mi. SW. from center of Anacortes, but within city limits. **Access:** Road. **Prop:** 20 acres deeded land. **Owner:** R. M. Brown, Seattle, Wash. (1941). M. Donopolis and S. W. Schreiber, Anacortes, Wash. (1934). **Ore:** Copper, gold, silver. **Ore min:** Copper carbonates. **Deposit:** Copper disseminated and in fractures in shear zone in granite. **Dev:** 8 shallow shafts. **Assays:** 1% to 2½% Cu, 0.05 oz. Au, 1 oz. Ag in sample from dump. **Ref:** 157. 158.

Bald Mountain (4)

Loc: Sec. 17, (34-6E), near summit of Bald Mtn. **Access:** Road and trail from Clear Lk. **Owner:** Bald Mountain Mining Co. (1902). **Ore:** Copper, gold. **Deposit:** Mineralized zone 16 ft. wide in schist. **Dev:** 60-ft. shaft, 50-ft. shaft, and 420-ft. crosscut adit. **Assays:** One assay showed 30% Cu, \$3.00 Au. **Ref:** 88, p. 52.

Bornite

(see North Coast under gold)

Boston (10)

(see under lead)

British

(see Skagit Queen under silver)

Buchanan

(see Queen and Buchanan)

Cliff (12)

(see under zinc)

Dispassi**Loc:** On Dispassi Cr., 5 mi. up Skagit R. from Marblemount. **Ore:** Copper, gold. **Ref:** 63, p. 54.**Dorothy**

(see Thunder Creek under lead)

Ella Bea and Flaim (16)**Loc:** NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, (35-13E), W. of Soldier Boy Cr. **Access:** Trail. **Prop:** 2 claims: Ella Bea, Flaim. **Ore:** Copper. **Ore min:** Pyrite. **Deposit:** Altered and pyritized rock. **Dev:** Open cuts. **Assays:** One assay showed no Au, 0.06% Cu. Another assay showed no Au, 0.07% Cu. **Ref:** 158.**Elsie (11)****Loc:** SE $\frac{1}{4}$ sec. 24, (35-13E), in Boston Basin. **Access:** About 2 mi. by trail from road. **Prop:** 2 claims: Elsie, Pochantes. **Owner:** O. W. Mandahl, Sedro Woolley, Wash. (1951). **Ore:** Copper. **Ore min:** Chalcopryrite, pyrite. **Gangue:** Quartz. **Deposit:** 2 parallel stringers about 4 ft. apart in diorite. **Dev:** 50-ft. adit. **Ref:** 158.**Fidalgo**

(see under manganese)

Fidalgo (Stephens)

(see Stephens)

Fidalgo Island (3)**Loc:** Secs. 1 and 2, (34-1E). **Access:** 4 $\frac{1}{2}$ mi. by road to railroad at Anacortes. **Owner:** Lester E. Gibbons, Anacortes, Wash. (1940). **Ore:** Copper, gold, silver. **Deposit:** Vein 4 ft. wide. **Dev:** 20-ft. shaft. **Assays:** \$20.00 per ton. **Ref:** 158.**Flaim**

(see Ella Bea and Flaim)

Higgins Mountain

(see Lawrence)

Jackman Creek**Loc:** Cascade dist. **Ore:** Copper. **Ref:** 158.**Johnsburg (15)**

(see under lead)

Lakeside

(see under lead)

Lawrence (Higgins Mountain) (5)**Loc:** SW $\frac{1}{4}$ sec. 28, (33-8E), on N. slope of Higgins Mtn. **Access:** Trail from Darrington highway 1 mi. W. of Hazel. **Prop:** 2 claims: Nugget Nos. 1 and 2. **Owner:** W. J. Lee (1941). **Ore:** Copper. **Ore min:** Chalcopryrite, pyrite, bornite, arsenopyrite, tetrahedrite (?). **Deposit:** A 3-ft. fracture zone in granodiorite contains 3 mineralized quartz stringers from $\frac{1}{2}$ to 9 in. wide. Granodiorite is in the form of a 50-ft. dike cutting Chuckanut sediments. **Dev:** Reportedly an adit. **Ref:** 158.**Logan No. 2 (7)**

(see under silver)

Marine

(see under gold)

Matrix**Loc:** 6 mi. SW. of Anacortes. **Access:** Road. **Prop:** 150 acres deeded land. **Owner:** Matrix Mining and Milling Co. (1934). **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopryrite, bornite, copper. **Deposit:** Lenses in sheared zones in granodiorite and greenstone. **Dev:** 40-ft. shaft, several open cuts. **Assays:** \$5.00 to \$55.00. **Ref:** 158.**Midas (13)**

(see under silver)

Mountain Home

(see under manganese)

North Coast (6)

(see under gold)

Protection (8)

(see under lead)

Queen and Buchanan (17)**Loc:** SW. side of Cascade R., in NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, (35-13E). **Access:** Trail. **Prop:** 2 unpatented claims: Queen, Buchanan. **Owner:** Rupert Buchanan, Rockport, Wash. (1951). **Ore:** Copper, lead. **Ore min:** Chalcopryrite, pyrite, galena. **Gangue:** Quartz. **Deposit:** 3-ft. hydrothermally altered sheared zone in 40-ft. hornblendite dike. Sulfides in zone 3 to 6 in. wide. **Dev:** 80-ft. adit. **Ref:** 158.**Skagit Queen (9)**

(see under silver)

Soldier Boy (14)

(see under gold)

Standard

(see under silver)

Stephens (Fidalgo) (2)**Loc:** Center N $\frac{1}{2}$ sec. 26, (35-1E), within city limits of Anacortes. **Access:** Road within 300 ft. of workings. **Owner:** Brown Bros. Timber Co. and James Stephens, Seattle, Wash. (1943). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite. **Gangue:** Quartz, chlorite. **Deposit:** Shear zone in granodiorite 10 ft. wide and exposed for 600 ft. Zone is serpentized and weakly mineralized. **Dev:** 5 shallow shafts and an open cut. **Assays:** Shipment said to have run 2% copper with a little gold and silver. **Prod:** 1 shipment to Tacoma smelter. **Ref:** 158.**Thunder Creek**

(see under lead)

SKAMANIA COUNTY

Athens**Loc:** Mining Cr., Mt. St. Helens dist. **Ore:** Copper, gold, silver, lead, zinc. **Ref:** 63, p. 50.**Black Falls****Loc:** NW $\frac{1}{4}$ sec. 18, (10-6E), Mt. St. Helens dist. **Ore:** Copper. **Ref:** 63, p. 50.**Black Hornet****Loc:** T. 10 N., R. 5 E., Mt. St. Helens dist. **Ore:** Copper. **Ore min:** Chalcopryrite, pyrite. **Deposit:** 4-ft. vein. **Ref:** 63, p. 50.

Bronze Monarch (Martha Washington) (22)

Loc: Sec. 36, (10-5E), adjoining the Sweden property on the NW., Mt. St. Helens dist. **Elev:** 3,700 ft. **Access:** ¼ mi. by trail from Sweden property. **Owner:** Mount St. Helens Consolidated Mining Co. (1907-1926). Mining Corporation of Portland, Ltd. (1902). Bronze Monarch Mining Co. (1907). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, lesser amounts of chalcopyrite. **Deposit:** Fault zone in granite 3 ft. wide. Mineralized quartz cements breccia in the zone. **Dev:** 300-ft. adit. **Assays:** Ore said to av. \$28 in Cu, Au, Ag. **Ref:** 33, 1907, p. 800; 1908, p. 952. 88, p. 95. 98, 1920-1926.

Bumble Bee

Loc: T. 10 N., R. 5 E., Mt. St. Helens dist. **Ore:** Copper, lead, zinc. **Ore min:** Chalcopyrite, galena, sphalerite. **Deposit:** 4½-ft. vein with 8- and 10-in. paystreaks. **Ref:** 63, p. 50.

Chicago (16)

Loc: NW¼ sec. 32, (10-6E), 2½ mi. NE. of Spirit Lk., Mt. St. Helens dist. **Access:** ¼ mi. by trail E. of Norway Pass. **Prop:** Several claims. **Owner:** Mining Corporation, Ltd. of Portland (1902). **Ore:** Copper, gold, silver, zinc. **Ore min:** Pyrite, arsenopyrite, chalcopyrite, sphalerite, native copper. **Deposit:** An 8-in. quartz vein in granodiorite. **Dev:** 200-ft. adit. **Assays:** Two assays showed 0.3% to 2.0% Cu, tr. to 0.10% Pb, 0.5% to 1.8% Zn, 0.11 to 0.12 oz. Au, 0.04 to 0.09 oz. Ag. **Ref:** 63, p. 50. 88, pp. 95-96. 111, p. 5.

Chief

(see Ripper and Chief)

Cinnabar (3)

(see also Toledo)

Loc: Sec. 13, (10-5E), Mt. St. Helens dist. **Prop:** Part of Toledo group. **Ore:** Copper. **Ref:** 63, p. 50.

Coe

(see Sweden)

Columbia Gold and Copper

(see Miners Queen)

Commonwealth (15)

Loc: Near SW. cor. sec. 33, (10-6E), Mt. St. Helens dist. **Access:** 6 mi. NE. of Spirit Lk. Ranger Station on the Spirit Lk.-Guler trail. **Ore:** Copper, zinc, lead. **Ore min:** Chalcopyrite, sphalerite, galena, arsenopyrite. **Deposit:** Shear zone in basalt contains irregular lenses of quartz as much as 2 ft. wide. Ore minerals occur in the quartz and along fractures in the footwall. **Dev:** 340-ft. drift and a shaft. **Ref:** 158.

Copper Bottom

Loc: T. 10 N., R. 5 E., Mt. St. Helens dist. **Ore:** Copper, lead. **Ore min:** Chalcopyrite, galena. **Ref:** 63, p. 50.

Copper Canyon Mines

(see Yellow Jacket and Hoo Hoo)

Copper Dyke

Loc: Mt. St. Helens dist. **Ore:** Copper, gold. **Assays:** 2% Cu, \$1.00 Au (1902). **Ref:** 105, no. 2, 1902, p. 29.

Crystal (1)

Loc: Sec. 8, (10-5E), Mt. St. Helens dist. **Owner:** Messrs. Koontz, Witt, Burbee (1897). **Ore:** Copper. **Dev:** 36-ft. shaft. **Ref:** 63, p. 50.

Earl

(see Samson)

Germania (10)

(see under gold)

Goat Mountain

Loc: Mt. St. Helens dist. **Ore:** Copper. **Ref:** 158.

Golconda (12)

(see under gold)

Gold Creek

(see Zinc Creek under zinc)

Grizzly Creek (13)

(see under gold)

Hoo Hoo

(see Yellow Jacket and Hoo Hoo)

Independence (6)

Loc: Secs. 2, 3, 10, and 11, (10-5E), on Black Mtn., opposite the Minnie Lee mine, Mt. St. Helens dist. **Access:** Trail. **Prop:** 6 claims. **Ore:** Copper, gold, silver, lead. **Ore min:** Bornite. **Deposit:** Vein 14 in. to 4 ft. wide in granite. **Dev:** 3 adits, one of which has 125 ft. of crosscut and 275 ft. of drifts. **Assays:** \$30 in Au, Ag, Cu, Pb. **Ref:** 58, p. 32. 158.

Index (5)

Loc: Near SE. cor. sec. 18, (10-6E), 2½ mi. NW. of the Chicago group, Mt. St. Helens dist. **Prop:** 12 claims: Index Nos. 1 to 12. **Owner:** Mount St. Helens Consolidated Mining Co. (1907-1926). Mining Corporation, Ltd. of Portland (1902). **Ore:** Copper, gold, silver. **Ref:** 33, 1907, p. 800; 1908, p. 952. 88, p. 96. 98, 1920-1926. 158.

Juanita

Loc: About ½ mi. from the source of Green R. **Owner:** U. M. Lauman, W. A. Reynolds, and David Stuart (1901). **Ore:** Copper, gold. **Deposit:** Vein 6½ ft. wide. **Dev:** 50-ft. adit. **Assays:** Ore av. \$37 in Cu, Au. **Ref:** 88, pp. 96-97.

Last Chance (28)

Loc: SW¼SE¼ sec. 29, (3-5E), on Washougal R. **Elev:** 1,600 ft. **Access:** 14 mi. by road and 1 mi. by trail from railroad at Cape Horn. **Owner:** Leon Montchalin, Washougal, Wash. (1953—). H. S. McGowan, McGowan, Wash. (1943). Mable McGowan, Chinook, Wash. (1951-1953). **Ore:** Copper, vanadium, gold, silver, lead, zinc. **Ore min:** Bornite, chrysocolla, desclozite (?). **Deposit:** Shear zone in diorite contains several parallel veins of quartz. Main vein is 1 to 4 ft. wide. Zone as a whole is sparsely mineralized. **Dev:** Shaft reportedly 475 ft. deep, 930-ft. adit, and another adit caved at the portal. **Assays:** Vein est. to carry 1.5% Cu over a width of 1 to 3 ft. for length of 400 ft. Picked samples show 1% to 2% V₂O₅ and 0.25% to 0.50% on composite samples. Other assays show an av. of 0.13 oz. Au, 7.2 oz. Ag, 7.5% Cu. Green and yellow material found coating druses at face of the adit was the material which showed V₂O₅ content. Spectrographic analysis of the green and yellow coatings showed 1% to 10% V, 1% to 10% Pb, 8% Cu, 8% Zn. **Ref:** 158.

Last Hope (4)

Loc: Sec. 13, (10-5E), Mt. St. Helens dist. **Ore:** Copper. **Ref:** 63, p. 50.

Martha Washington

(see Bronze Monarch)

Maybee (24)

Loc: S½NW¼ sec. 14, (3-5E), Washougal R. area. **Access:** Road to within 1 mi. **Prop:** State lease. **Owner:** W. C. Daly, Portland, Ore. (1952—). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, bornite. **Dev:** 3,000-ft. adit, 1,000-ft. incline shaft, caved (1952). **Prod:** 6 or more wagonloads of mill conc. in 1917. **Ref:** 157. 158.

Miners Queen (Columbia Gold and Copper) (23)

Loc: Near center N½ sec. 4, (3-5E), on Miners Cr., Washougal dist. **Access:** 4½ mi. by road from Sunset Ranger Station. 15 mi. by road to railroad at Yacolt. **Prop:** 7 claims. **Owner:** J. W. McMahan, Portland, Oreg. (1950—). **Ore:** Copper, molybdenum. **Ore min:** Chalcopyrite, magnetite, malachite, molybdenite, pyrite. **Gangue:** Quartz, tourmaline, sericite. **Deposit:** An area about 80 by 140 ft. in which are small discontinuous veinlets and disseminations of copper and molybdenum sulfides in altered diorite. **Dev:** 6 short adits, 30-ft. shaft, a deeper shaft. Several hundred ft. of diamond drilling in 3 holes had been completed by the U. S. Bureau of Mines by the end of July 1955. **Assays:** Best ore shows about 3% Cu. **Ref:** 157, 158.

Minnie Alice (2)

Loc: Sec. 8, (10-5E), Mt. St. Helens dist. **Ore:** Copper, silver. **Ref:** 63, p. 50.

Minnie Lee (7)

Loc: Secs. 2 and 3 (?), or sec. 18 (?), (10-5E), Mt. St. Helens dist. **Owner:** Mount St. Helens Consolidated Mining Co. (1907-1926). Cascadia Mining & Development Co. (1902-1926). **Ore:** Copper, silver, gold. **Ref:** 33, 1907, p. 800; 1908, p. 952. 58, p. 44. 98, 1922-1926.

Morning (14)

Loc: NE¼ sec. 20, (10-6E), Mt. St. Helens dist. **Ore:** Copper. **Ref:** 158.

Mount Fairy (17)

(see under gold)

Mountain King

Loc: Washougal dist. **Ore:** Copper, gold, silver. **Ref:** 105, 1903, p. 111.

Northern Light

Loc: Mt. St. Helens dist. **Owner:** Spirit Lake Power and Mining Co. (1908-1915). **Ore:** Copper. **Ref:** 158.

Northwestern

Loc: Mt. St. Helens dist. **Ore:** Copper. **Ref:** 158.

Norway (18)

(see also Sweden)

Loc: Near SW. cor. sec. 31, (10-6E), 1,000 ft. up the mountain from the Bronze Monarch property, Mt. St. Helens dist. **Elev:** 3,648 ft. **Access:** Trail from Sweden mine. **Prop:** 9 claims. **Owner:** Mount St. Helens Consolidated Mining Co. (1907-1942). Mining Corporation, Ltd. of Portland (1902). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite, pyrrhotite. **Gangue:** Breccia, gouge, quartz. **Deposit:** A brecciated zone 4 ft. wide in granodiorite contains a little disseminated pyrite and chalcopyrite. **Dev:** 350-ft. adit. **Assays:** 5 samples from an ore shoot 50 ft. long gave a weighted av. of 2.44% Cu across 3.9-ft. thickness. **Ref:** 33, 1907, p. 800; 1908, p. 952. 88, p. 95. 98, 1920-1926. 157, 158.

Polar Star (11)

Loc: SW¼ sec. 17, (10-6E), near Black Falls on Green R., Mt. St. Helens dist. **Prop:** 11 patented and 19 unpatented claims. **Owner:** Geo. S. Reid, Portland, Oreg. (1941). Cascadia Mining & Development Co. (1902-1926). Mount St. Helens Consolidated Mining Co. (1907-1926). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, malachite. **Gangue:** Quartz, sericite, breccia. **Deposit:** Breccia zone in granite from a few in. to 2 ft. wide is leached, silicified, and sericitized. Mineralization is light and consists mostly of pyrite. **Dev:** 80-ft. adit with an 84-ft. drift, 35-ft. shaft, 900-ft. adit. **Assays:**

4% to 15% Cu, 0.095 oz. Au, 3 to 5 oz. Ag. **Prod:** Small amount prior to 1934. **Ref:** 33, 1907, p. 452; 1908, p. 952. 58, p. 55. 63, p. 50. 88, p. 96. 91, pp. 247-248. 98, 1918-1926. 114, no. 6, 1906, p. 79. 158.

Portland Elkhorn

Loc: Mt. St. Helens dist. **Ore:** Copper. **Ref:** 158.

Rainbow (27)

(see under vanadium)

Ripper and Chief

Loc: About 4 mi. NE. of Spirit Lk., Mt. St. Helens dist. **Prop:** 2 claims: Ripper, Chief. **Owner:** Messrs. McClure and Hostetter (1901). **Ore:** Copper, gold, lead. **Ore min:** Chalcopyrite, galena. **Deposit:** Vein about 4 ft. wide. **Assays:** Max. \$60 in Cu, Au. **Ref:** 88, p. 97.

St. Helens

(see Sweden)

Samson (Earl) (9)

Loc: SE¼ sec. 8, (10-6E), at base of Goat Mtn., Mt. St. Helens dist. **Prop:** 20 claims. **Owner:** Mount St. Helens Consolidated Mining Co. (1907-1926). Mining Corporation, Ltd. (1901). **Ore:** Copper, gold, silver. **Deposit:** Large low-grade deposit said to be 500 to 1,000 ft. wide. **Dev:** 600 ft. of adit. **Assays:** Max. \$3 in Cu, Au, Ag. **Ref:** 33, 1907, p. 800; 1908, p. 952. 63, p. 49. 88, p. 96. 98, 1920-1926. 158.

Skamania (26)

Loc: SE¼SW¼ sec. 21, (3-5E), on W. Fk. of Washougal R. **Elev:** 1,700 ft. **Access:** 16 mi. by road from railroad at Cape Horn. 1½ mi. upstream from the Last Chance mine. **Owner:** L. P. Montchalín, Washougal, Wash., Mabel McGowan, Chinook, Wash. (1953—). **Ore:** Copper, gold, silver, vanadium. **Ore min:** Chalcopyrite, bornite, chalcocite, covellite, malachite, azurite, chrysocolla. **Deposit:** Leached vuggy quartz vein up to 5 ft. thick in granodiorite is sparsely mineralized with copper minerals. **Dev:** 2 adits, one 200 ft. long, the other about 1,000 ft. long, and a 425-ft. shaft near one adit portal. **Assays:** Av. of 4 samples showed 0.06 oz. Au, 3.29 oz. Ag, 4.59% Cu. **Ref:** 105, 1916, pp. 744-745. 158.

Sweden (Coe, St. Helens) (19)

(see also Norway)

Loc: Near NW. cor. sec. 6, (9-6E), ½ mi. N. of the NE. end of Spirit Lk., Mt. St. Helens dist. **Elev:** 3,340 ft. **Access:** Trail from end of the road on S. side of the lake. **Prop:** 8 claims. **Owner:** Mount St. Helens Consolidated Mining Co. (1905-1943). Mining Corporation, Ltd. of Portland. (1902). **Ore:** Copper, gold, silver, zinc. **Ore min:** Pyrite, chalcopyrite, sphalerite, pyrrhotite. **Gangue:** Quartz. **Deposit:** Fault zone in granite from 6 in. to 4 ft. wide contains sparsely disseminated sulfides. **Dev:** 2,240-ft. adit with 3 crosscuts. Caved at 1,700 ft. (1942). **Assays:** 4 samples from an ore shoot 150 ft. long gave a weighted av. of 2.80% Cu across 3.2-ft. thickness. Another ore shoot 80 ft. long gave a weighted av. from 5 samples of 3.21% Cu across a 4.2-ft. thickness. **Prod:** 2 carloads of ore in 1928. **Ref:** 33, 1907, p. 800; 1908, p. 952. 63, pp. 49-50. 65, p. 2. 88, pp. 94-95. 91, p. 248. 97, 1929, p. 427. 98, 1920-1926. 157, 158.

Toledo (8)

(see also Cinnabar)

Loc: Sec. 12, (10-5E), Mt. St. Helens dist. **Prop:** Includes Cinnabar property. **Ore:** Copper. **Ref:** 58, p. 68. 63, p. 50.

Washington

Loc: Mt. St. Helens dist. **Ore:** Copper. **Ref:** 58, p. 71.

White Swan

Loc: Bald Mtn. area. **Owner:** Washougal Copper & Refining Co. (1916). **Ore:** Copper. **Prod:** Test shipment in 1916. **Ref:** 97, 1916, p. 613.

Yellow Jacket and Hoo Hoo (Copper Canyon Mines) (26A)

Loc: NE¼ sec. 21, (3-5E), on Washougal R. **Access:** 16½ mi. by road from railroad at Cape Horn. **Prop:** 11 claims. **Owner:** Hugh Ringquist, Camas, Wash. (1953—). **Ore:** Copper, silver. **Assays:** 4½ tons shipped in 1953 ran 5½% Cu, 3.95 oz. Ag. **Ref:** 69-A, p. 9. 158.

Yellow Metals (20)

Loc: Sec. 31, (10-6E), 2½ mi. NE. of Spirit Lk., Mt. St. Helens dist. **Access:** Trail over Norway Pass. **Prop:** Several claims. **Owner:** Mining Corporation, Ltd., of Portland (1901). **Ore:** Copper, gold, silver. **Deposit:** Similar to the Chicago. **Assays:** Max. \$60 in Cu, Au, Ag. **Ref:** 88, pp. 95-96.

Young America (21)

Loc: Sec. 6, (9-6E), adjoining Norway and Bronze Monarch properties on the NE., Mt. St. Helens dist. **Prop:** 5 claims. **Owner:** Mining Corporation, Ltd., of Portland (1901). **Ore:** Copper, gold, silver. **Deposit:** Mineralized zone 12 ft. wide is traceable for 2,000 ft. **Dev:** 50-ft. drift. **Ref:** 88, p. 95.

Zinc Creek (25)

(see under zinc)

SNOHOMISH COUNTY**Ala-Dickson (78)**

Loc: NE¼ sec. 7, (29-10E). **Elev:** 3,000 ft. **Access:** Near Williamson Cr. trail 3¾ mi. from Sultan R. **Prop:** 2 unpatented claims. **Owner:** John H. and Robert J. Dickson (1943). **Ore:** Copper, lead, zinc, gold, silver. **Ore min:** Galena, sphalerite, pyrrhotite, arsenopyrite, chalcopyrite. **Gangue:** Quartz, talc, and carbonates of calcium, magnesium, and iron. **Deposit:** 4 parallel zones 2 to 3 ft. wide, within an area 90 ft. wide, contain mineralized quartz-carbonate veins 2 to 12 in. wide. Wall rock is serpentinized peridotite. **Assays:** Presence of Ag, Au indicated by assays. **Ref:** 23, pp. 50-51.

Alleghany

(see Foggy)

Alpha

(see under gold)

Alta (140)

(see under gold)

Anaconda

Loc: 12 mi. above mouth of Beckler R., Index dist. **Prop:** 4 claims. **Owner:** J. Frank Bleakley and Charles Shepp. **Ore:** Copper, silver. **Ore min:** Chalcopyrite, bornite. **Gangue:** Calcite, quartz. **Deposit:** Contact between porphyry and slate. **Ref:** 63, p. 35.

Arlington (67)

Loc: NE¼ sec. 11, (30-9E), about 2 mi. NW. of Silverton on Marten Cr. **Prop:** 4 claims. **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopyrite, galena, pyrite. **Deposit:** Quartz vein with max. width of 75 ft. is more or less mineralized with sulfides. **Dev:** 20-ft. adit in ore, 1,000-ft. crosscut not reaching ore. **Assays:** \$12.60 Au, \$6.20 Ag, 35% Cu from the high-grade ore. **Ref:** 14, p. 40. 63, pp. 21-22.

Armament (Wayside) (175)

Loc: NW¼ sec. 30, (28-11E). **Access:** 7½ mi. from railroad at Index by road along the E. side of the N. Fk. of Skykomish

R. **Prop:** 1 claim: Armament No. 1. **Owner:** Karl and Karin Elizabeth Paykull, Seattle, Wash., leasing from R. M. Brown, Pheom and Marjorie Boyle (1942-1949). Robert McDonald and John H. Cashier (1942). **Ore:** Molybdenum, copper. **Ore min:** Molybdenite, chalcopyrite, pyrite, molybdite, scheelite, malachite. **Gangue:** Quartz and altered diorite. **Deposit:** Stockwork in gneissoid quartz diorite of short discontinuous quartz veinlets containing molybdenite and chalcopyrite. The ore body has exposed dimensions of 120 ft. by 140 ft. by a 20-ft. depth, but its limits are not known. Veinlets up to 3 in. wide and mostly at least 6 in. apart. **Dev:** Several small open cuts and 2 road cuts. **Assays:** Three 10-ft. channel samples from the better ore showed 0.06%, 0.24%, 0.11% MoS₂; 0.15%, 0.30%, 0.36% Cu. **Ref:** 14, p. 16. 158.

Bald Mountain (29)

Loc: 2 mi. N. of Silverton on W. side of Deer Cr., probably in sec. 1, (30-9E). **Access:** Old wagon road up Deer Cr. **Prop:** The Golden Chord claims and the Lakeview claim. **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopyrite, galena, pyrite. **Deposit:** Quartz vein containing sulfide minerals. An extension of the Arlington vein. **Assays:** \$7 to \$9 in Au, Ag, Cu. **Ref:** 14, p. 40. 63, p. 22.

Bangor Creek (Bornite) (44)

Loc: Sec. 20, (30-10E), on W. Fk. of Bangor Cr. at mouth of Deer Cr., 1 mi. E. of Silverton. **Elev:** 4,500 ft. **Prop:** 11 claims, 6 millsites. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite. **Deposit:** Andesite dike carrying bands and masses of bornite and chalcopyrite. Outcrop shows from 4 to 6 ft. of ore. **Dev:** 3,000-ft. crosscut adit that cuts no ore. **Assays:** Av. samples show 12% Cu, 0.051 oz. Au, 4 oz. Ag. **Ref:** 14, p. 41. 158.

Bear (141)

(see under gold)

Beckler River

Loc: T. 27 N., R. 12 E., at the head of Beckler R., Index dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Ref:** 14, p. 16.

Bell and Crown (73)

Loc: Sec. 30, (30-10E), on the divide at E. Fk. of Bender Cr. about 1 mi. S. of Silverton. **Access:** Trail up Bender Cr. **Prop:** 17 claims. **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopyrite, galena, pyrite. **Gangue:** Quartz. **Deposit:** Main vein is from 8 to 30 ft. wide in porphyry and slate. Width of ore av. about 12 ft., chiefly on hanging wall. A cross vein 12 ft. wide carries 6 ft. of ore. 3 other small veins with 2 and 3 ft. of ore. **Assays:** 10.5% Cu, \$8 in Au, Ag. High-grade ore runs as much as \$30 per ton. **Ref:** 14, p. 41. 63, p. 19.

Big Bear and Butte (26)

(see under gold)

Big Copper (77)

Loc: NE¼ sec. 4, (29-10E), on S. side of Hall Peak, Sultan dist. **Prop:** 6 claims. **Ore:** Copper, cobalt, gold, silver. **Ref:** 14, p. 47. 63, p. 24.

Big Raymond (120)

(see under gold)

Bitter Creek (188)

Loc: Sec. 11, (27-10E), about 4½ mi. NE. of Index on Bitter Cr. **Elev:** 3,300 ft. **Access:** Trail up Bitter Cr. **Prop:** 6 claims: Wonder Nos. 1 and 2, Standard, Standard Nos. 1 and 2, Maud. **Owner:** Bitter Creek Mining & Milling Co. (1912). **Ore:** Copper. **Ore min:** Bornite, chalcopyrite, pyrite, hematite. **Gangue:** Crushed and altered granodiorite. **Deposit:** Mineral-

ized shear zone 2 ft. wide in granodiorite is impregnated with copper minerals. **Dev:** 200-ft. adit, 600-ft. adit. **Assays:** Av. ore is low grade. **Ref:** 14, p. 16. 172, p. 84.

Black Hawk (174)
(see under gold)

Black Hawk (56)

Loc: Sec. 3, (30-9E), Silverton dist. **Prop:** 1 patented claim. **Ore:** Copper. **Ref:** 14, p. 41.

Blackman
(see Doris)

Blackstone (143)

Loc: Sec. 8, (28-11E), in Hancock Gulch, Silver Cr. dist. **Ore:** Copper, silver. **Deposit:** 11-ft. vein. **Assays:** 4 oz. Ag, 9.9% Cu. **Ref:** 14, p. 29. 63, p. 32.

Blomquist (64)

Loc: E½SE¼ sec. 18, (30-7E). **Access:** ½ mi. by road and trail E. of Granite Falls. **Prop:** 20 acres of deeded land. **Owner:** A. J. Blomquist, Lake Stevens, Wash. (1946). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, covellite, malachite, chrysocolla. **Gangue:** Quartz. **Deposit:** Shear zone 10 in. wide in granodiorite contains sparsely disseminated chalcopryrite. **Dev:** Open cut 40 ft. long. **Assays:** Picked sample assayed 4.2% Cu, 0.20 oz. Au, 1 oz. Ag. **Ref:** 158.

Blue Bird (19)
(see under gold)

Blue Rock (84)

Loc: Near center sec. 11, (29-11E), on W. side of Goat Lk., Monte Cristo dist. **Prop:** 4 claims. **Ore:** Copper, gold, silver. **Ore min:** Arsenopyrite, chalcopryrite, pyrite. **Deposit:** One fracture zone carrying 3½ ft. of ore and another 5 to 20 ft. wide with some ore. **Dev:** 10-ft. shaft, 35-ft. adit. **Ref:** 14, p. 22. 63, p. 16.

Bluebell (142)
(see under gold)

Bluff (144)
(see under gold)

Bon Ton (87)

Loc: SE¼ sec. 14, (29-11E), 1 mi. S. of Goat Lk., Monte Cristo dist. **Prop:** 5 claims. **Ore:** Copper, gold, silver. **Ore min:** Bornite, chalcopryrite, pyrite. **Deposit:** 10- to 12-ft. fracture zone that can be traced about 650 ft. on the surface. Ore body from 4 to 8 ft. wide. **Assays:** \$16 to \$27 Au, Ag. **Ref:** 14, p. 22. 63, p. 16.

Bonanza
(see Mineral Center under gold)

Bonanza Queen (32)

Loc: Secs. 7, 8, 17, and 18, (30-10E), on Deer Cr. about ½ mi. N. of Silverton. **Elev:** 3,000 ft. **Access:** 1½ mi. by trail and 2 mi. by road from Silverton, 97 mi. to smelter at Tacoma. **Prop:** 18 claims. **Owner:** B. L. Aufer and R. R. Forbes, Seattle, Wash. (1953—). Bonanza Queen Mining Co. (1908-1915). M.N.R. Mining Co. (1919). P. H. Holdsworth, Seattle, Wash. (1942). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, pyrrhotite, arsenopyrite, sylvanite, realgar. **Gangue:** Quartz, calcite, altered diorite. **Deposit:** 10- to 75-ft. fracture zone exposed for 3,000 ft. on the surface. Massive sulfides in lenses in shear zone in argillite. Best lens is 60 ft. long, 5 to 10 ft. wide, and has been explored to depth of 100 ft. **Dev:** 3 adits totaling 3,000 ft. and showing a depth of 1,500 ft. **Assays:** 2% to 6% Cu, 1 to 6 oz. Ag, 0.02 to 0.19 oz. Au. **Prod:** Approx. 830 tons of ore by 1918, which is reported to have av. 3.5%

Cu, 0.04 oz. Au, 2 to 3 oz. Ag. **Ref:** 14, p. 39. 33, 1908, p. 392. 63, p. 20. 88, p. 69. 91, p. 248. 97, 1919, p. 494. 114, no. 5, 1909, p. 99. 157. 158. 159, p. 136.

Border Queen (99)

Loc: NW¼ sec. 33, (29-9E). **Elev:** 1,900 ft. **Access:** In Olney Pass on Sultan Basin road. **Prop:** 1 unpatented claim. **Owner:** Richard Sykes (1942). **Ore:** Copper. **Ore min:** Pyrite and tr. of arsenopyrite and chalcopryrite. May also contain gold. **Gangue:** Silicified dike rock. **Deposit:** 2- to 4-ft. altered and silicified dike or sill in argillaceous schist. **Dev:** 2 drifts, one 37 ft., the other 45 ft. long. **Improv:** Small, recently built cabin (1942). **Ref:** 23, pp. 78-79.

Bornite
(see Bangor Creek)

Boston

Loc: Darrington dist. **Owner:** Jumbo Copper Mining Co. (1922-1929). **Ore:** Copper, gold. **Ref:** 14, p. 8. 97, 1929, p. 428. 98, 1922-1926. 158.

Broken Ridge (Silver Creek) (163)

Loc: S½ sec. 18, (28-11E), Silver Cr. dist. **Elev:** 1,400 to 3,100 ft. **Access:** Graveled road up Silver Cr. **Prop:** 4 patented claims: Dewey, Northern Bell, Schley, Nugget Chief; and 17 unpatented claims. **Owner:** Rosaia Mining Co., Seattle, Wash. (1956). Fred Magnusen, Index, Wash. (1951). **Ore:** Copper, silver, gold, zinc. **Ore min:** Chalcopryrite, pyrite, bornite, sphalerite, quartz. **Gangue:** Silicified metamorphic rock, quartz. **Deposit:** Silicified and mineralized shear zones in metamorphic rocks. Moderate radioactivity in one place on Dewey claim. **Dev:** One adit several hundred ft. long, one 90 ft. long, and several open cuts. **Improv:** Cabin. **Assays:** 3.1% Cu, 3 oz. Ag, some Au. **Prod:** 1934. **Ref:** 14, p. 28. 97, 1935, p. 354. 150, p. 28. 158.

Brown
(see Doris)

Buckeye (195)

Loc: SE¼ sec. 33, (27-10E), about 1 mi. W. of Halford, Index dist. **Elev:** 2,500 ft. **Access:** 1½ mi. by trail from Eagle Falls on the S. Fk. of Skykomish R. **Prop:** 16 claims and 2 millsites: Buckeye Nos. 1 to 16. **Owner:** Buckeye Copper Co. (1912). **Ore:** Copper, silver, gold. **Ore min:** Chalcopryrite, bornite, cuprite, chalcocite. **Gangue:** Quartz, calcite, crushed and altered granodiorite. **Deposit:** 2 mineralized shear zones ranging in width from mere seams to 6 ft. They are largely barren of ore except for small lenses. **Dev:** 3 adits with drifts totaling 1,500 ft., numerous open cuts. **Assays:** \$1 to \$2 Au, tr. Ag. **Prod:** Several tons of high-grade ore were packed out on horses prior to 1912 and shipped to the Tacoma smelter. **Ref:** 14, pp. 14-15. 33, 1908, p. 417. 58, p. 10. 162, pp. 88-90.

Bullet (71)

Loc: NE¼ sec. 21, (30-9E), on the mountain at mouth of Gordon Cr., Silverton dist. **Prop:** Bullet, Wad, and Hope claims. **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, arsenopyrite. **Deposit:** 12- to 14-ft. mineralized zone between walls of syenite and serpentine traceable for 4,500 ft. on the surface. **Dev:** 35-ft. adit. **Assays:** \$2 to \$39 Au, Cu, Ag. One sample taken across about 6 ft. of the ore showed \$15 Au, Ag. **Ref:** 14, p. 41. 63, p. 23.

Bullion King
(see under gold)

Bunker Hill
(see Copper Belle)

Bunker Hill (57)

Loc: Sec. 4, (30-9E), Silverton dist. **Ore:** Copper. **Ore min:** Chalcopyrite, pyrrhotite. **Deposit:** 2-ft. vein of solid sulfides. **Dev:** Adit. **Ref:** 14, p. 4. 158.

Burns (15)

(see under gold)

Bush and Curry

Loc: Index dist. **Ore:** Copper. **Prod:** 1916, 1917. **Ref:** 97, 1917, p. 504; 1918, p. 508.

Butte and Big Bear

(see Big Bear and Butte under gold)

Calumet (106)

(see under gold)

Calumet (189)

Loc: Secs. 11 and 12, (27-10E), on the ridge between the N. and S. branches of Bitter Cr., Index dist. **Elev:** About 4,000 ft. **Access:** Trail up Bitter Cr. **Prop:** 4 claims. **Owner:** W. S. Dewey (1912). **Ore:** Copper, zinc. **Ore min:** Chalcopyrite, pyrite, sphalerite. **Gangue:** Quartz, calcite, altered granodiorite. **Deposit:** Mineralized shear zone as much as 8 ft. wide in granodiorite. **Dev:** 100-ft. adit, 500-ft. adit, several open cuts. **Ref:** 14, pp. 16-17. 162, pp. 82-83.

Calumet

(see Glacier Peak)

Caplin-Holbrooke (129)

(see under gold)

Cascade (Homestead) (187)

Loc: Sec. 12, (27-10E) and sec. 7, (27-11E), on the S. side of Trout Cr., Index dist. **Elev:** About 2,000 ft. **Access:** 1 mi. SE. of the Sunset mine by truck and bulldozer roads. 7 mi. from railroad at Index. **Prop:** 11 claims. **Owner:** W. Proper and O. T. Majors, Index, Wash. (1942). Homestead Copper Co. (1909). Cascade Copper Co. (1926). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Quartz. **Deposit:** Mineralized shear zones in granodiorite. A 1-ft. vein consists of slightly mineralized nodules and stringers in a shear zone. **Dev:** Several short adits and a 310-ft. crosscut that fails to cut the ore. **Assays:** Ore is low grade. **Ref:** 14, p. 17. 58, p. 30. 98, 1922-1926. 111, p. 5. 112, p. 183. 130, p. 79. 158. 162, p. 79.

Champion (139)

(see under gold)

Charlotte (180)

Loc: SW $\frac{1}{4}$ sec. 35, (28-10E), about $\frac{1}{2}$ mi. SW. of the Ethel mine on NW. side of N. Fk. of Skykomish R., Index dist. **Elev:** 1,000 ft. **Access:** Reached by trail from Curry's ranch. **Owner:** Riley Curry, Index, Wash. (1942). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, chalcocite. **Deposit:** Small lenses of ore along a shear zone in granodiorite. Ore body 20 ft. in dia. with a max. width of 6 ft. About 1 carload of ore in sight. **Dev:** 150-ft. drift, 20-ft. drift, 35-ft. drift, and short winze. **Prod:** 2 carloads of high-grade ore. **Ref:** 14, p. 15. 158.

Chatman

(see Jerry Chatman)

Chickamun

(see Forest-Chickamun)

Clara Thompson

(see Jasperson under gold)

Cleveland (45)

(see also Ore Recoveries)

Loc: SW $\frac{1}{4}$ sec. 20, (30-10E), adjoining the Copper Independent property, Silverton dist. **Access:** Trail. **Prop:** 4 claims. **Owner:** Ore Recoveries Corp. (1941). Virginia-Agenda Co. (1922-1930). **Ore:** Copper, gold, silver, lead. **Ore min:** Pyrite, chalcopyrite, arsenopyrite, galena. **Deposit:** Intersecting veins with several ore bodies 2 ft. wide. **Dev:** 72-ft. adit. **Assays:** \$29 Cu, Au, Ag. **Ref:** 14, pp. 41-42. 46, pp. 164-165. 63, p. 18. 97, 1930, p. 675. 98, 1922-1926. 114, no. 5, 1909.

Cliff (58)

Loc: Sec. 3, (30-9E), near Marten Cr., Silverton dist. **Elev:** 3,925 ft. **Ore:** Copper. **Ore min:** Chalcopyrite, marcasite. **Deposit:** Several 2- to 4-in. stringers of fairly well mineralized rock and quartz in granodiorite. **Dev:** 30-ft. adit. **Ref:** 14, p. 42. 158.

Colts (33)

Loc: SW $\frac{1}{4}$ sec. 7, (30-10E), on a fork of Deer Cr., Silverton dist. **Access:** $\frac{1}{2}$ mi. from wagon road up Deer Cr. **Prop:** 4 claims. **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite. **Deposit:** Vein or mineralized zone containing 3 ft. of rich ore and 7 ft. of concentrating ore. **Dev:** 14-ft. and 16-ft. adits on the vein and a 55-ft. crosscut that failed to contact the ore. **Assays:** 26% Cu, 18 $\frac{1}{2}$ oz. Ag, \$3.40 Au for the high-grade ore. **Ref:** 14, p. 42. 63, p. 21.

Columbia Mountain

(see under antimony)

Commercial (178)

Loc: SE $\frac{1}{4}$ sec. 32, (28-11E), Index dist. **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 4-ft. vein traceable for 300 ft. on the surface. **Assays:** \$12 to \$20 Au, Cu. **Ref:** 63, p. 34.

Commonwealth

(see Jasperson under gold)

Commonwealth

(see under gold)

Consolidated

(see under gold)

Cooperative (Howard) (173)

Loc: SE $\frac{1}{4}$ sec. 29, (28-11E) and secs. 4 and 5, (27-11E). **Access:** Trail up Howard Cr. from road on N. Fk. of Skykomish R. **Prop:** 16 claims. **Owner:** Cooperative Mining Syndicate (1912). **Ore:** Copper, gold, silver, lead, zinc. **Ore min:** Chalcopyrite, bornite, pyrite. **Deposit:** Mineralized shear zones in quartzite and granodiorite. **Dev:** Several adits aggregating about 1,500 ft., an old shaft of unknown depth, and several open cuts. **Assays:** Samples from old shaft assayed \$1 to \$6 Au. **Ref:** 14, p. 17. 63, p. 33. 162, pp. 79-80.

Copper

(see Merchant)

Copper Belle (Bunker Hill) (160)

Loc: Secs. 1, 2, 11, and 12, (27-9E), on S. slope of the mountain NE. of the old station of Reiter, Index dist. **Elev:** 1,500 ft. **Access:** 1 mi. by trail N. of Reiter. **Prop:** 18 patented claims. **Owner:** Wiatrak Mining & Developing Co., Inc., Seattle, Wash. (1955—). Bunker Hill Mining & Milling Co. (1902-1905). Copper Belle Mining Co. (1907). Western Copper Mining Co. (1918-1926). Shamrock Mining Co. (1927). **Ore:** Copper, gold, silver, tungsten. **Ore min:** Chalcopyrite, pyrite, bornite, magnetite, hematite. **Gangue:** Quartz, calcite, crushed and altered granodiorite. **Deposit:** Lens-shaped bodies of ore in shear zones in granodiorite. Main ore body was a lens 30 ft. wide. **Dev:** Main adit 2,000 ft. long with drifts and stopes. 7 other shorter

adits. Considerable diamond drilling. **Improv:** 200-ton mill under construction at Gold Bar (1955). **Assays:** Av. said to be 8% Cu, \$2.00 Ag, tr. Au. **Prod:** Several hundred lb. of copper matte prior to 1910. **Ref:** 7-A, p. 18. 14, p. 15. 33, 1907, p. 400; 1908, p. 423. 88, p. 80. 91, p. 243. 97, 1900, p. 337; 1906, p. 367; 1908, p. 580. 98, 1918-1926. 100, 1900, p. 82. 104, 12/15/27, p. 32. 105, no. 10, 1905, p. 160; no. 4, 1908, p. 111. 112, p. 211. 114, no. 6, 1906, p. 79; no. 5, 1909, p. 110. 129, pp. 290-291. 158. 159, p. 135. 162, pp. 90-92.

Copper Chief (145)

Loc: NW¼ sec. 7, (28-11E), on W. side of Silver Cr. **Prop:** 4 claims. **Owner:** Copper Chief Mining Co. (1901-1918). **Ore:** Copper, gold, silver, lead. **Ore min:** Chalcopryrite, galena, arsenopyrite. **Deposit:** 8-ft. vein. **Dev:** 320-ft. adit. **Assays:** Av. \$24 Cu, Au, Ag. **Ref:** 14, p. 30. 33, 1907, p. 511. 88, p. 75. 98, 1918, p. 73.

Copper Cliff

(see under gold)

Copper King (184)

Loc: NW¼ sec. 1, (27-10E), 475 ft. N. of Sunset lode, Index dist. **Prop:** 1 patented claim. **Owner:** F. M. Jordan, Seattle, Wash. **Ore:** Copper. **Ore min:** Black copper oxide, bornite, chalcopryrite, malachite. **Deposit:** Similar to Sunset. **Prod:** Has produced. **Ref:** 129, pp. 287-288. 158.

Copper Prince (46)

(see under gold)

Copper Queen (69)

Loc: Sec. 13, (30-9E), N. of Silverton. **Elev.** 4,550 ft. **Ore:** Copper, gold. **Ore min:** Pyrrhotite. **Deposit:** Mineralization in metasediments as masses and pods. **Dev:** Short adit. **Assays:** Less than 1% Cu, 40¢ Au. **Ref:** 14, p. 42. 158.

Copperhead (34)

Loc: SW¼ sec. 18, (30-10E), on Long Mtn., Silverton dist. **Prop:** 19 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite. **Deposit:** Vein ranges from 2 in. to 5 ft. in width. Sixteen smaller veins and stringers known to occur. **Assays:** \$10 to \$70 per ton. **Ref:** 14, p. 42. 63, p. 19.

Courtney (10)

Loc: SW¼ sec. 27, (32-9E), on Jumbo Mtn., Darrington dist. **Ore:** Copper, silver, gold, lead. **Deposit:** 3-ft. vein. **Dev:** 10-ft. adit. **Assays:** \$8.50 Au, 14% Cu, 15 oz. Ag, 4% Pb. **Ref:** 14, p. 8. 63, p. 51.

Covered Wagon (164)

Loc: NE¼ sec. 19, (28-11E), on W. side of Silver Cr., ½ mi. N. of Galena. **Owner:** Lawrence V. Whitfield, Monroe, Wash. (1952). Formerly owned by C. F. Armstrong, Index, Wash. **Ore:** Copper, gold. **Ref:** 133, p. 32. 158.

Crown

(see Bell and Crown)

Curry

(see Bush and Curry)

Dahl

(see Eclipse under gold)

Damm

Loc: T. 31 N., R. 15 E., on Miners Ridge at head of Suiattle R., Glacier Peak dist. **Elev:** 5,500 to 6,500 ft. **Access:** Reached by road and trail up Railroad Cr. or up Suiattle R. **Prop:** Covers a length of about 2 mi. **Owner:** Damm brothers, Seattle, Wash. **Ore:** Copper, silver, gold. **Deposit:** Mineralized shear zone in granitic country rock. Shear zone is 600 ft. wide and exposed for a length of 1,500 ft. to a depth of more than 1,000

ft. **Dev:** Open cuts and several adits in ore. **Improv:** Small cabin. **Assays:** \$1 to \$1.50 Au, 3 to 5 oz. Ag. 3% to 3.5% Cu. **Note:** Probably this is an alternate name for the Glacier Peak property. **Ref:** 14, p. 12. 158.

Darrington

(see Gold Mountain)

Darrington (Elwell-Darrington)

(see Elwell-Darrington under gold)

Deer Lake (25)

Loc: SW¼ sec. 36, (31-9E), on the mountains overlooking Deer Lk., Silverton dist. **Prop:** 10 claims. **Ore:** Copper. **Ore min:** Chalcopryrite. **Deposit:** 4-ft. vein, 6-ft. vein. **Dev:** Two 60-ft. adits, 40-ft. adit, and two crosscuts of unknown length. **Ref:** 14, p. 42. 63, p. 21.

Del Campo

(see under gold)

Delta

Loc: Silver Cr. dist. **Owner:** Judge Denny, Everett, Wash. (1892). **Ore:** Copper, lead, gold, silver. **Ore min:** Galena, chalcopryrite. **Gangue:** Quartz. **Deposit:** 5-ft. vein. **Ref:** 13, p. 159. 14, p. 31.

Deway (162)

(see under gold)

Diamond Hitch (124)

Loc: Sec. 31, (29-11E), on W. Fk. of Silver Cr. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite. **Deposit:** 4 in. of ore along a shear zone. **Dev:** 45-ft. adit. **Ref:** 14, p. 31. 63, p. 30.

Doris (Blackman, Brown) (112)

Loc: E½ sec. 34 and W½ sec. 35, (29-10E), Sultan dist. **Elev:** 3,000 to 3,700 ft. **Prop:** 5 unpatented claims. **Owner:** Kelly Summerfield (1943). Western Metals Corp. (1928). **Ore:** Copper, silver. **Ore min:** Chalcopryrite, pyrite, a little sphalerite, small amount scheelite. **Gangue:** Quartz, brecciated metamorphics. **Deposit:** Mineralized fault zones 1 to 4 ft. wide in quartzite and hornfels. **Dev:** 250-ft. drift, 200-ft. crosscut, and two 6-ft. drifts. **Ref:** 23, pp. 60-62. 106, 9/1/28; 9/17/28, pp. 5-6. 158.

Drum Lummond (59)

Loc: Sec. 4, (30-9E), Silverton dist. **Prop:** 1 patented claim. **Ore:** Copper. **Ref:** 14, p. 43.

Dry Creek

(see under gold)

Eclipse (43)

(see under gold)

Edison (121)

(see under gold)

El Dorado (86)

Loc: NW¼ sec. 13, (29-11E), ¾ mi. SE. of Goat Lk., Monte Cristo dist. **Ore:** Copper, silver, gold. **Ore min:** Chalcopryrite, pyrite. **Deposit:** Narrow mineralized fracture. **Dev:** Short adit. **Assays:** \$6 to \$21 Au, \$2 to \$7 Ag, as high as 21% Cu. **Ref:** 14, p. 23. 63, p. 15.

Eldred (81)

Loc: Sec. 11, (29-10E), at headwaters of Stilaguamish R. **Access:** ½ mi. from the main Sunrise trail. **Prop:** 1 claim. **Owner:** R. H. Spurlock and J. Sahlborn, Marysville, Wash. (1942). **Ore:** Copper, tungsten. **Ore min:** Pyrite, arsenopyrite, minor chalcopryrite and scheelite. **Deposit:** Quartz vein 12 to 16 in. wide in argillite and conglomerate. **Dev:** 40-ft. drift with a 15-ft. crosscut. **Ref:** 158.

Elmo

(see Gold Bar and Elmo under lead)

Elwell-Darrington (11)

(see under gold)

Empire

(see Merchant)

Ethel (Ethel Consolidated) (181)

Loc: Secs. 34 and 35, (28-10E), about 5½ mi. NE. of Index on S. side of Excelsior Cr. **Elev:** 1,250 to 2,100 ft. **Access:** Reached by trail from Curry's ranch. **Prop:** At least 13 claims. **Owner:** Dr. George Warren, Seattle, Wash. (1942). Ethel Consolidated Mines Co. (1902-1907, 1908-1918). Ethel Copper Mining Co. (1907). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, bornite, chalcocite, pyrite. **Gangue:** Quartz, calcite, fluorite, decomposed granodiorite. **Deposit:** Shear zone in granodiorite is a few in. to 27 ft. in width and carries a little ore. **Dev:** 4 adits aggregating 4,000 ft. with drifts and stopes. Winze about 250 ft. in depth. **Assays:** Ore av. about 4% Cu, 8 oz. Ag. **Prod:** About 400 tons. **Ref:** 14, p. 15. 33, 1907, p. 590; 1908, p. 673. 88, pp. 78-79. 97, 1907, 1908, 1918. 98, 1918, p. 84. 114, no. 4, 1907, p. 55; no. 5, 1907, p. 108. 158. 159, p. 135. 162, pp. 74-76.

Ethel Consolidated

(see Ethel)

Eureka (37)

Loc: SE¼ sec. 14, (30-10E), on the divide between Perry and Falls Creeks, Silverton dist. **Prop:** 15 claims. **Owner:** Ore Recoveries Corp. leasing from Lambda Chemical Corp. (1941). **Ore:** Copper, silver, gold, lead. **Ore min:** Chalcopryrite, galena, tetrahedrite. **Deposit:** 2 veins. **Dev:** 7 adits up to 75 ft. in length. **Assays:** 4 to 36 oz. Ag, \$1.00 Au. **Ref:** 14, p. 43. 46, pp. 164-165. 63, p. 22.

Everett (47)

Loc: NE¼ sec. 20, (30-10E), Silverton dist. **Prop:** 3 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite, tetrahedrite. **Deposit:** 3 veins, 6 to 14 in. wide. **Ref:** 14, p. 43. 63, p. 18.

Evergreen (165)

Loc: NW¼ sec. 20, (28-11E), on E. side of Silver Cr. just above Galena. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite. **Deposit:** 16- to 20-ft. vein carrying from 2 to 4 ft. of ore. **Dev:** 30-ft. adit with 75 ft. of drifts. **Assays:** \$5 to \$65 Au, 3% to 27% Cu. **Ref:** 13, p. 158. 14, pp. 31-32. 63, p. 32.

Fanny (42)

(see under gold)

Feldt (72)

(see under silver)

Florence-Rae (185)

Loc: Sec. 2, (27-10E), on the ridge between Trout and Bitter Creeks, Index dist. **Elev:** 1,780 ft. **Access:** Adjacent to road on SE. side of N. Fk. of Skykomish R. **Prop:** 10 claims. **Owner:** Cascade Mining Co. (1907-1924). Florence-Rae Lumber, Land & Development Co. (1912). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, bornite, pyrite, hematite. **Gangue:** Crushed and altered granodiorite. **Deposit:** Slightly mineralized shear zone in granodiorite. **Dev:** 150-ft. adit and several open cuts. **Assays:** 2% to 50% Fe, 2 oz. Ag, tr. Au. **Ref:** 14, p. 17. 97, 1917, p. 504; 1918, p. 508. 98, 1918-1925. 116, no. 1, 1907, p. 17; no. 3, 1908, p. 60. 158. 162, pp. 83-84.

Florence Rae (Rudebeck-Florence Rae) (107)

Loc: Secs. 26 and 27, (29-10E). **Elev:** 4,450 ft. **Access:** End of Sultan Basin road is at E. end of property. **Prop:** 14 unpatented claims. **Owner:** Harry Rudebeck, Index, Wash. (1951). North Coast Copper Co. (1917). Miners Smelting & Refining Co. (1934). Florence Rae Mining Co. (1936). Kromona Mines Corp. (1940-1941). **Ore:** Copper, silver, gold, nickel. **Ore min:** Chalcopryrite, pyrite, pyrrhotite, sphalerite, magnetite, little galena, specular hematite, chromite, scheelite. **Gangue:** Quartz, calcite, amphibole, some serpentine. **Deposit:** One lens of chromite ore 4 by 5 ft., other smaller lenses. 4 principal vein systems: Margaret Moshier, Lambert, Copper King, and Junie, in metamorphics, peridotite, and quartz diorite. **Dev:** 1,400 ft. of underground workings on Moshier, 170-ft. drift on Junie. **Assays:** 505 tons shipped 1938-1941 av. 0.01 oz. Au, 2.36 oz. Ag, 12.40% Cu, 0.8% Zn, 0.07% Ni. **Prod:** 606.11 tons crude ore in periods 1918-1919, 1937-1941. **Ref:** 14, pp. 46-47. 23, pp. 55-60. 68, p. 8. 97, 1938-1941. 104, 4/30/34, pp. 21-22; 12/15/36, p. 27. 158.

Foggy (Alleghany, Penn) (88)

Loc: SW¼SW¼ sec. 13, (29-11E), on the NE. slope of Cadet Peak, Monte Cristo dist. **Elev:** 5,500 ft. **Access:** Trail up Elliot Cr. from the Sauk R. road. **Prop:** 3 patented claims: Foggy Lode, New York, 95. **Owner:** Dr. W. J. Collings, Renton, Wash. (1949). **Ore:** Copper, gold, silver, lead, zinc, antimony, arsenic. **Ore min:** Arsenopryrite, pyrite, chalcopryrite, galena, sphalerite, stibnite, realgar. **Gangue:** Quartz. **Deposit:** A partially mineralized fracture zone can be traced for 5,000 ft. on the surface. Surface ores are galena, sphalerite, chalcopryrite, stibnite, and realgar. **Ore** at depths of more than 200 ft. are pyrite and arsenopryrite. **Dev:** More than 1,000 ft. of adit is reported to give a depth of 1,000 ft. below the surface. **Assays:** Av. 0.2 oz. Au, 8 oz. Ag, 3% to 5% Zn, 3% to 4% Pb, 3.15% As, 5.5% Sb. **Prod:** Amount not known. **Ref:** 14, p. 20. 63, p. 15. 132, pp. 134-135. 149, pp. 816, 842. 158.

Forest-Chickamun (20)

Loc: Darrington dist., a short distance from the town of Darrington. Possibly in sec. 24, (32-9E). **Owner:** North Coast Mining & Reduction Co. (1908-1918). New Century Exploration and Reduction Co. (1907). **Ore:** Copper **Ore min:** Arsenopryrite, chalcopryrite, pyrite. **Gangue:** Quartz. **Deposit:** Small mineralized quartz veins filling fissures in sheared argillite. Zone of fissuring av. 3½ ft. in width. Mineralization sparse. **Dev:** Adit consists of a crosscut and two drifts. **Ref:** 14, p. 8. 33, 1907, p. 854; 1908, p. 1053. 98, 1918, pp. 113, 115. 159, p. 134.

Forest Hope (16)

Loc: SE¼ sec. 18, (32-10E), Darrington dist. **Prop:** 3 claims. **Ore:** Copper, gold, silver, mercury. **Ore min:** Cinnabar, native mercury. **Deposit:** 8 ft. of ore for 1,000 ft. on the surface. This splits into 3 veins, 4, 5, and 6 ft. wide. **Assays:** \$6 to \$36 Au, tr. to 18 oz. Ag, 10% to 18% Cu. **Ref:** 14, p. 8. 63, p. 52.

"48-55" (Garnet, Vesper Peak) (79)

Loc: Center sec. 9, (29-10E), 300 ft. SW. of ridge crest. **Elev:** 5,500 ft. **Access:** No trail. Reached by hiking to summit of Vesper Peak, thence about ½ mi. NW. along ridge toward Little Chief Peak. **Prop:** 1 unpatented claim. **Owner:** P. E. Crane, Snohomish, Wash. (1943). **Ore:** Nonmetallics constitute principal value. **Ore min:** Small amounts chalcopryrite, arsenopryrite. **Gangue:** Calcite, grossularite, augite, diopside, epidote, prehnite, scapolite (?), vesuvianite, hillebrandite (?). **Deposit:** Limestone lens altered by contact metamorphism forms body 70 ft. long and 50 ft. wide. **Dev:** A few shallow cuts. **Ref:** 23, p. 70.

"45" (74)

(see under silver)

Four Brothers (41)

Loc: NE¼ sec. 19, (30-10E), W. of the Helena group, Silverton dist. **Prop:** Group of claims. **Owner:** Copper-Independent Consolidated Mining Co. (1901-1908). **Ore:** Copper. **Dev:** 130 ft. of adits. **Ref:** 14, p. 43. 33, 1907, p. 518; 1908, p. 557. 88, p. 70.

Fox

Loc: Near Silverton on Long Mtn. **Access:** Easily accessible. **Ore:** Copper. **Deposit:** Body of pyrrhotite 30 ft. or more wide, 2,000 to 3,000 ft. long. **Assays:** Less than 0.75% Cu. **Ref:** 14, p. 43. 158.

Garnet

(see "48-55")

Glacier Peak (Calumet) (31)

Loc: Sec. 10, (31-15E), on a steep ridge on N. side of Miners Cr., Glacier Peak dist. **Elev:** 5,300 to 6,200 ft., near crest of Cascade Mtns. **Access:** 51 mi. from railroad at Darrington, up Suiattle R., 12 mi. of which is by trail. 26 mi. from Lucerne up Railroad Cr., 12 mi. of which is by road. **Prop:** 32 claims and a millsite. 12 patented claims: Annie, Beatrice, Calumet, Discovery, Hecla, Maggie, Mary, Morning Star, Prince, S.A.W., Raymond, Viva. **Owner:** Glacier Peak Mining & Smelting Co. (1900—), leasing to Bear Creek Mining Co., Spokane, Wash. (1953—). Vogelsang Bros. (Minerals Separation Co.) (1917). American Metals Co. (1917-1918). International Smelting & Refining Co. (1943). Hanna Coal & Ore Corp., Cleveland, Ohio (1937-1952). **Ore:** Copper, molybdenum, gold, silver. **Ore min:** Molybdenite, chalcocopyrite, pyrite, pyrrhotite, enargite, arsenopyrite, sphalerite, galena, scheelite, malachite, chalcocite, cuprite, native copper. **Gangue:** Quartz, mica, carbonates, tourmaline, ilmenite, kaolinite, talc. **Deposit:** Closely spaced joints in quartz diorite are filled with quartz veinlets mineralized with chalcocopyrite and molybdenite. The ore minerals also replace ferromagnesian minerals in the rocks. Copper is distributed uniformly but molybdenum erratically. 2 similar ore bodies are 1,000 ft. apart, and adjacent to the main ore body is a massive, generally barren, quartz plug, which contains a few high-grade areas. The main ore body is at least 600 ft. by 350 ft. in cross section and 400 ft. deep, and the NE, ore body is thought to be similar but smaller. It is egg shaped in cross section and is known to extend to a 500-ft. depth, but the lower boundary is not known. **Dev:** 6 adits and an open cut. One adit 450 ft. long, the others 100 to 150 ft. long. Diamond drill holes: 1,984 ft. in 3 holes by American Metals Co., 19,079 ft. in 36 holes by Hanna Coal & Ore Corp., 6,822 ft. by International Smelting & Refining Co., 6,800 ft. by Bear Creek Mining Co. **Assays:** More than 1,000 assays indicate several million tons of ore containing about 1% Cu, 0.1% MoS₂, plus about twice as much ore containing about 0.6% Cu, 0.03% MoS₂. Av. values of 0.0022 oz. Au, 0.283 oz. Ag have been determined. **Ref:** 14, p. 12. 22, p. 6. 68, p. 10. 97, 1929, p. 428. 98, 1926, p. 1581. 105, 1912, p. 711. 108, 6/56, pp. 60-61. 112, p. 179. 116, 1910, pp. 62-64. 133-B, pp. 63-64. 158.

Glengarry

(see under silver)

Gold Bar (125)

Loc: Sec. 31, (29-11E), Silver Cr. dist. **Ore:** Copper, lead, gold, silver. **Ore min:** Chalcocopyrite, galena, pyrite. **Ref:** 14, p. 32. 63, p. 30.

Gold Bar and Elmo

(see under lead)

Gold Eagle (122)

(see under gold)

Gold Mountain (Darrington) (22)

Loc: Sec. 31, (32-10E), on Gold Mtn., on N. side of Sauk R. opposite mouth of Clear Cr. **Access:** Truck road. **Prop:** 8 claims. **Owner:** Mr. Cornelius and associates, Mount Vernon, Wash. (1942). **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite, tetrahedrite (?), pyrrhotite, and minor amounts of sphalerite and galena. **Deposit:** Quartz veins in schist. One vein is traceable for 125 ft. and has a max. width of 8 ft. It narrows to a width of 1 ft. in a short distance, however. 2 other veins are about 1 ft. wide. **Dev:** Crosscut with 125 ft. of drift and another old adit in barren rock. **Assays:** \$18 to \$36 Au, tr. to 18 oz. Ag, \$18 to \$32 Cu. **Ref:** 14, p. 8. 58, p. 26. 63, p. 52. 158.

Golden Chord (68)

(see under gold)

Golden Eagle (110)

(see under molybdenum)

Good Hope (130)

(see under gold)

Good Luck (172)

Loc: SW¼ sec. 21, (28-11E), Index dist. **Access:** 11 mi. by road from railroad at Index. **Prop:** 4 or more claims. **Owner:** E. S. Turner, Tom Swaboda, and Fred Simmerer (1949). Dr. James Brannon and associates, Index, Wash. (1943). **Ore:** Copper. **Deposit:** Schist, quartzite, and granite, in which is a quartz pegmatite dike containing sparse mineralization. Dike can be traced for 500 ft. and is 50 to 100 ft. thick, but only a very small part of this is ore. **Dev:** Open cut. **Ref:** 68, p. 10. 157.

Granite Mountain

Loc: On Marble Mtn., Silverton dist. **Ore:** Copper, gold. **Ore min:** Chalcocopyrite, pyrite. **Deposit:** Mineralized shear zone 16 to 40 ft. wide in porphyry. **Assays:** \$6.40 to \$12 per ton. **Ref:** 14, p. 44. 63, p. 19.

Gray Eagle (161)

Loc: Sec. 17, (28-11E), on E. side of Silver Cr. **Ore:** Copper, silver, lead. **Ore min:** Galena, chalcocopyrite. **Deposit:** Vein. **Dev:** One crosscut adit. **Ref:** 14, p. 32. 63, p. 32.

Great Northern (98)

(see under gold)

Great Scott (135)

(see under gold)

Green Crown (2)

Loc: SE¼ sec. 31, (32-9E), on Whitehorse Mtn., Darrington dist. **Prop:** 2 claims. **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite. **Deposit:** Shear zone 100 ft. wide in which are mineralized quartz veins as much as 10 in. wide. **Assays:** \$100 Au, 32 oz. Ag, 26% to 42% Cu. **Ref:** 14, p. 9. 63, p. 51.

Grizzly

Loc: On Clear Cr. beyond the Helena mine, Silverton dist. **Prop:** 4 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcocopyrite, bornite. **Deposit:** 2 wide veins and 1 narrow vein with 24 in. of ore. **Dev:** Adit and 18-ft. shaft on narrow vein. **Assays:** \$50 Au, Ag, Cu. **Ref:** 14, p. 44. 63, p. 21.

Gunn Peak (190)

Loc: Sec. 14, (27-10E), near the headwaters of Canyon Cr., 3½ mi. NE. of Index. **Elev:** 2,500 ft. **Access:** Trail. **Prop:** 5 claims. **Owner:** Gunn Peak Copper Mining Co. (1902-1912). Index-Bornite Copper Mining Co. (1908). **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite, bornite. **Gangue:** Crushed granodiorite. **Deposit:** Nearly vertical 3-ft. shear zone in granodi-

orite is slightly mineralized. **Dev:** 455-ft. adit, 10-ft. adit. **Assays:** Av. samples said to run 11.4% Cu, \$1.92 Ag, tr. Au. **Ref:** 14, p. 17. 33, 1907, p. 660; 1908, pp. 768, 809. 88, p. 82. 114, no. 5, 1909. 162, pp. 85-86.

Hammond

(see Keystone)

Hancock (123)

Loc: Sec. 31, (29-11E), ½ mi. N. of Mineral City, Silver Cr. dist. **Ore:** Copper, gold, silver, nickel, cobalt. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 15- to 30-ft. vein with 1½ to 3 ft. of ore. **Dev:** 40-ft. adit. **Ref:** 14, p. 33. 63, p. 29.

Hannah (24)

Loc: NW¼ sec. 31, (31-10E), Silverton dist. **Prop:** 8 claims. **Ore:** Copper. **Dev:** 40-ft. adit. **Assays:** \$10 Cu. **Ref:** 14, p. 44. 63, p. 20.

Hannah (3)

Loc: NE¼ sec. 32, (32-9E), on Whitehorse Mtn., Darrington dist. **Prop:** 5 claims. **Ore:** Copper, gold, silver. **Deposit:** 3 ft. of ore in granite country rock. **Assays:** \$19.85 Au, 41 oz. Ag, 30% Cu. **Ref:** 14, p. 9. 63, p. 51.

Hard Pass (113)

Loc: SE¼ sec. 36, (29-10E), on W. side of Sheep Gap Mtn., Sultan dist. **Prop:** 1 claim. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, tetrahedrite. **Dev:** 10-ft. adit. **Ref:** 14, p. 48. 63, p. 25.

Hecla (30)

Loc: Sec. 2, (30-9E), at the head of Marten Cr., Silverton dist. **Access:** About 5½ mi. from Silverton by trail and road. **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite, marcasite. **Gangue:** Quartz. **Deposit:** Slightly mineralized joints in granodiorite. Small amounts of the ore minerals and quartz. **Dev:** Open cuts. **Ref:** 14, p. 44.

Helena (197)

Loc: NW¼ sec. 16, (27-10E), ½ mi. NE. of Index. **Elev:** 2,500 ft. **Access:** Trail. **Prop:** 2 claims: Tillicum, Tillicum Hill. **Owner:** William Cornwall, Index, Wash. (1912). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Quartz, calcite altered granodiorite. **Deposit:** 4-ft. mineralized shear zone in granodiorite consists of 1-in. sulfide bands alternating with altered granodiorite. **Dev:** 3 short adits aggregating 255 ft. **Ref:** 14, p. 17. 162, p. 86.

Helena (23)

Loc: SW¼ sec. 30, (31-10E), about 5 mi. N. of Silverton, on the divide between Deer and Clear Creeks. **Access:** Old wagon road from Silverton to St. Louis mine, thence by trail along the divide. **Prop:** 6 claims. **Owner:** Deer Creek Gold & Copper Mining Co. (1902-1907). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite. **Gangue:** Sheared granite, quartz. **Deposit:** At least 2 sulfide-bearing quartz veins in shear zones in granite. Large low-grade bodies of ore. **Dev:** Main adit 124 ft. long with 125 ft. of drifts. Another adit 1,000 ft. lower. **Assays:** \$19 to \$32 per ton. **Prod:** 150 tons shipped to Tacoma smelter. **Ref:** 14, p. 40. 33, 1907, p. 554. 63, pp. 19-20. 88, pp. 69-70.

Helena and Sadie (114)

Loc: SW¼ sec. 36, (29-10E), on W. side of Sheep Gap Mtn., Sultan dist. **Prop:** 2 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite. **Deposit:** 3 parallel shear zones in syenite, 2 of which are 30 in. wide with 18 in. of ore, and the third is 6 ft. wide with 40 in. of ore. The large zone is traceable for 2,000 ft. on the surface and the middle one for 300 ft. **Dev:**

Several short adits. **Assays:** 16% to 20% Cu, \$8 to \$10 Au. **Ref:** 14, p. 48. 63, p. 25.

Hicks

(see Sultan King)

Highland (5)

Loc: Sec. 3, (31-9E), near the headwaters of Buckeye Cr. on White Horse Mtn., Darrington dist. **Prop:** 5 claims. **Ore:** Copper, gold, silver. **Deposit:** 18 in. of ore. **Assays:** \$20 Au, 15 to 40 oz. Ag, 18% Cu. **Ref:** 14, p. 9. 63, p. 51.

J. J. Hill

(see under gold)

Holbrooke

(see Caplin-Holbrooke under gold)

Homestead

(see Cascade)

Hoodoo (48)

(see also Ore Recoveries)

Loc: SE¼ sec. 20, (30-10E), on Hoodoo Gulch, Silverton dist. **Access:** Wagon road ¾ mi. from the old railroad grade. **Prop:** 7 claims and 6 millsites. **Owner:** Ore Recoveries Corp. (1941). Stilaguamish & Sultan Mining Co. (1902-1918). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, pyrrhotite, stannite. **Gangue:** Quartz, calcite, country rock. **Deposit:** Veins in conglomerate and slate. **Dev:** 420-ft. main adit and shorter adits totaling 200 ft. in length. **Assays:** \$20 Cu, Ag, Au. **Ref:** 14, p. 44. 33, 1907, p. 1051. 46, pp. 164-165. 63, p. 18. 88, p. 66. 98, 1918, p. 136.

Hope (138)

(see under gold)

Horseshoe and Treasure Box (111)

(see under gold)

Howard

(see Cooperative)

Hunter (6)

Loc: NW¼ sec. 34, (32-9E), on Jumbo Mtn., Darrington dist. **Prop:** 2 claims. **Owner:** Messrs. Burns and Neste (1901). **Ore:** Copper, silver, lead, gold. **Ore min:** Chalcopyrite, galena. **Deposit:** Vein 3 ft. wide carries 9 in. of ore. **Dev:** 50-ft. adit, 3 open cuts. **Assays:** \$20 Au, 8 to 40 oz. Ag, 10% Cu, 4% Pb. **Ref:** 14, p. 9. 63, p. 51. 88, p. 63.

Hustler (82)

Loc: Sec. 12, (29-10E), at head of Stilaguamish R. **Prop:** 2 claims: Hustler, Hustler Extension. **Ore:** Copper, molybdenum, tungsten. **Ore min:** Chalcopyrite, pyrite, molybdenite, scheelite, arsenopyrite. **Deposit:** Quartz vein from 3 to 12 in. wide. **Dev:** 50-ft. adit, 100-ft. adit. **Ref:** 158.

Imperial (49)

Loc: Sec. 20, (30-10E), about 1½ mi. E. of Silverton. **Elev:** 2,500 ft. **Prop:** 11 claims, most important of which are the Anacortes and Mountain View. **Owner:** Imperial Mining Co. (1902-1909). **Ore:** Copper, silver, gold, lead. **Ore min:** Chalcopyrite, arsenopyrite, galena. **Deposit:** Main vein is along contact of diorite and conglomerate. **Dev:** 400 ft. of development. **Assays:** Main values are in copper and silver with only a small amount of gold. **Ref:** 14, p. 44. 33, 1907, p. 688. 88, pp. 68-69. 105, 9/05, p. 183. 114, no. 5, 1909, p. 99.

Independence (152)

Loc: Sec. 6, (28-11E), at Mineral City. **Access:** 14 mi. from railroad at Index. **Ore:** Copper. **Ore min:** Chalcopyrite, bornite. **Deposit:** Fissure vein in granodiorite and slate. **Assays:** Est. 3 tons selected ore had 3% Cu. **Ref:** 111, p. 5.

Index

(see Lake Serene)

Index Bornite (194)

Loc: Secs. 22 and 23, (27-10E), on Lewis Cr. 2½ mi. E. of Index. **Access:** 1 mi. trail up Lewis Cr. **Prop:** 2 claims: Barry, Hillside. **Owner:** Index Bornite Copper Mining Co. (1902-1917). **Ore:** Copper, silver. **Ore min:** Chalcopyrite, bornite, chalcocite. **Gangue:** Quartz, calcite, crushed granodiorite. **Deposit:** Mineralized shear zone in granodiorite. Sulfides occur as small impregnations and bands up to 4 in. wide. **Dev:** 70-ft. shaft and 2 adits aggregating 700 ft. **Assays:** 11.1% to 58.9% Cu, 3.8 to 8.6 oz. Ag. **Ref:** 14, pp. 17-18. 33, 1907, p. 689; 1908, p. 809. 58, p. 33. 88, p. 81. 114, no. 4, 1907, p. 55; no. 5, 1909. 116, no. 9, 1907, p. 19. 159, p. 135. 162, pp. 84-85.

Index-Independent

(see Lake Serene)

Index Peacock (191)

Loc: Sec. 14, (27-10E), on Canyon Cr. above the Gunn Peak prospect, Index dist. **Prop:** 4 claims. **Owner:** A. M. Watt, Seattle, Wash. (1912). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite. **Deposit:** 4-ft. shear zone in granodiorite. **Dev:** 100-ft. adit. **Ref:** 14, p. 18. 162, p. 85.

Iowa (Mint) (105)

Loc: NW¼ sec. 27, (29-10E), Sultan dist. **Elev:** 2,550 to 2,895 ft. **Access:** Truck road along N. Fk. of Sultan R. crosses the property. **Prop:** Mint and Mint No. 1 claims. **Owner:** Robert T. Curtiss, Monroe, Wash. (1952—). Iowa Mining Co. (1915). Sultan Basin Mining Co., Sultan, Wash. (1940-1945). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite and small amounts of scheelite, powellite, molybdenite, sphalerite, bornite, malachite. **Gangue:** Quartz, calcite, chlorite. **Deposit:** Mineralized fracture zones in diorite and metamorphic rocks. Zones vary in width from 2 or 3 in. to 48 in. One lens of ore is 16 to 22 in. thick. **Dev:** 3 adit levels comprise more than 1,000 ft. of underground workings. **Assays:** 104 tons of ore av. 20% Cu, 0.223 oz. Au, 3.23 oz. Ag. 43 tons of ore av. 14.68% Cu, 0.06 oz. Au, 3.10 oz. Ag. **Prod:** 104 tons of ore prior to 1937. 96 tons 1937-1941. **Ref:** 14, p. 47. 23, pp. 63-65. 37, p. 56. 97, 1915, p. 573; 1938, p. 459; 1941, p. 475. 158.

Iowa (Washington-Iowa)

(see Washington-Iowa)

Iron Mountain

(see under gold)

Isabell

(see Red Cross)

Jackson

(see St. Louis and Jackson)

Jamboree (146)

Loc: Sec. 7, (28-11E), Silver Cr. dist. **Ore:** Copper, gold. **Ore min:** Arsenopyrite, chalcopyrite. **Deposit:** 4-ft. vein. **Dev:** 20-ft. adit, 20-ft. shaft. **Ref:** 14, p. 33.

Jasperson (153)

(see under gold)

Jerry Chatman (104)

Loc: N½ sec. 27, (29-10E), Sultan dist. **Elev:** 2,700 ft. **Access:** ½ mi. NW. of the Mint (Iowa) camp by trail. **Prop:** Mint No. 3 claim. **Owner:** Sultan Basin Mining Co. (1943). **Ore:** Copper, tungsten. **Ore min:** Chalcopyrite, bornite, scheelite, malachite. **Gangue:** Quartz, brecciated quartzite, chlorite, serpentine. **Deposit:** 2½- to 4-ft. vein which in 125 ft. thins to 3 in. Vein consists of quartz and narrow zone of brecciated wall rock. **Dev:** 172-ft. adit. **Ref:** 23, pp. 62, 64. 37, p. 56.

Jesse (4)

(see under gold)

Jim Dandy (147)

(see under gold)

Johnson (101)

Loc: NE¼ sec. 7 and N½NW¼ sec. 8, (28-8E). **Owner:** Seth G. Johnson (1943). **Ore:** Copper. **Assays:** 8.6% Cu. **Ref:** 158.

Jones

(see Kromona)

Jumbo (119)

(see under gold)

Jumbo

(see under gold)

Junie

Loc: Sultan dist. **Owner:** Western Metals Corp. (1928). **Ore:** Copper, silver. **Ref:** 106, 9/1/28; 9/17/28, pp. 5-6.

Justin (17)

(see under gold)

Kazian (166)

Loc: S. center sec. 18, (28-11E). **Owner:** John Kazian, 3815 25th So., Seattle, Wash. (1945). **Ore:** Copper, lead, zinc. **Ore min:** Chalcocite, covellite. **Ref:** 158.

Kelly Creek (103)

Loc: NW¼ sec. 23, (29-10E). **Elev:** 3,200 ft. **Access:** ½ mi. up Kelly Cr. from Sultan Basin road. No trail. **Owner:** Abandoned (1945). **Ore:** Copper. **Ore min:** Pyrite, pyrrhotite, small amount of chalcopyrite. **Deposit:** A 1-ft. zone of sparsely mineralized gouge and breccia. Fractured quartzite with sparsely mineralized quartz veinlets. **Dev:** 30-ft. drift, 15-ft. adit, and 35-ft. adit. **Ref:** 23, p. 71.

Kena and Troly

(see Skrinde)

Keystone (Hammond) (97)

Loc: Sec. 28, (29-8E), Sultan dist. **Access:** ½ mi. from Sultan Basin road. **Prop:** 4 claims. **Owner:** P. C. Stoess, Seattle, Wash. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite. **Deposit:** Shear zones from 25 to 30 ft. wide and carrying disseminated chalcopyrite to a known depth of 300 ft. Exposed length is 700 ft. An est. 3,000 tons of ore in sight. **Dev:** Open cuts, 200-ft. crosscut adit that is expected to reach ore in about 400 more ft., giving a depth of 2,000 ft. **Assays:** Av. 0.27 oz. Au, 1.6 oz. Ag, 1.38% Cu. **Ref:** 14, p. 48. 104, 7/15/34, p. 26. 158.

Keystone (93)

(see under gold)

Keywinder (12)

Loc: SW¼ sec. 27, (32-9E), on Jumbo Mtn., Darrington dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite. **Deposit:** 3-ft. quartz vein. **Dev:** 75-ft. adit. **Ref:** 14, p. 9. 63, p. 51.

Kitanning (182)

Loc: Sec. 36, (28-10E) and sec. 31, (28-11E), Index dist., on N. side of the divide between Trout and Lost Creeks. **Elev:** 2,000 ft. **Access:** Adjacent to road on S. side of the N. Fk. of Skykomish R. **Prop:** 5 claims: Cuprite, Wonder, Copper Pick, Copper Idol, Copper Bar. **Owner:** Judson C. Hubbard, Seattle, Wash. (1909). Twentieth Century Alaska Copper Co. (1908). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, chalcocite, pyrite. **Gangue:** Quartz, crushed granodiorite. **Deposit:** Small body of high-grade ore in the form of a 2½-ft. mineralized shear zone

in granodiorite. **Dev:** 525-ft. adit. **Ref:** 14, p. 18. 33, 1908, p. 1345. 88, p. 82. 114, no. 4, 1907, p. 55. 162, pp. 76-77.

Kromona (Scriber, Jones) (109)

Loc: Near center sec. 13, (28-9E), in Sultan Basin. **Elev:** 2,500 to 5,000 ft. **Access:** 5 mi. from Olney Pass by road. About 19 mi. from railroad at Sultan. **Prop:** 8 claims, 5 millsites. **Owner:** Kromona Mines Corp., Seattle, Wash. (1937—). Kromona Mining & Smelting Co. (1916-1937). **Ore:** Copper, silver, gold, molybdenum, tungsten. **Ore min:** Chalcopyrite, pyrite, pyrrhotite, molybdenite, scheelite, powellite, marcasite, bornite, malachite. **Gangue:** Quartz, calcite, shattered wall rock. **Deposit:** Shear zone across the contact of quartz diorite and old metamorphic rocks. Ore in places is slightly radioactive. **Dev:** 800-ft. adit with 225-ft. drift at 3,500 ft. elev. and a 58-ft. drift at 3,800 ft. (1953). Natural cave called the "Bear Cave." Development work in 1954 totaled 1,500 lineal ft. of raises, drifts, and crosscuts. **Improv:** Tram, 120-ton mill, bunkhouse (1955). **Assays:** 7 old assays show 1.4% to 38.4% Cu, 1.2 to 18.2 oz. Ag, 0.05 to 2.0 oz. Au. Later information indicates av. to be 2% to 4% Cu, 1 to 2 oz. Ag, \$2 to \$4 Au. A 4,860-lb. test shipment in 1952 showed 0.58 oz. Au, 1.76 oz. Ag, 12.81% Cu. One assay across a 6-ft. vein showed 7.62% Cu, 2.18 oz. Ag, 0.24 oz. Au. **Prod:** 4,860-lb. test shipment in 1952 gave net smelter return of \$138.06. 1953. 102 tons conc. in 1954 had av. assay of 24.33% Cu, 4.20 oz. Ag, 0.5 oz. Au, and netted \$13,191. 1955. **Ref:** 14, p. 48. 23, pp. 75-78. 37, p. 56. 98, 1918-1926. 104, 4/30/34, pp. 21-22. 106, no. 2, 1920, pp. 4-5; 9/1/28. 112, p. 187. 117, no. 14, 1922, p. 5. 129, pp. 293-296. 133, p. 36. 158.

Lake Serene (Index-Independent, Wilbur Index, Index, Pride of Index) (198)

Loc: SW $\frac{1}{4}$ sec. 30, (27-10E), about 2 mi. S. of Index. **Access:** 3 mi. by road from railroad at Index. **Prop:** 5 claims: Sixteen to One, Crown Jewel, Copper Queen, Mystery, Pride of Index. **Owner:** Lake Serene Mining Co., Inc., Snoqualmie, Wash. (1949-1951). Index-Independent Mining Co. (1902-1907). **Ore:** Copper, gold, silver. **Ore min:** Bornite, chalcopyrite, chalcocite, pyrite, azurite. **Gangue:** Quartz. **Deposit:** Mineralized fissures in granodiorite. Current exploration has exposed an 8-in. vein of solid bornite (1950). **Dev:** Three adits, one 470 ft., one 170 ft., and another 261 ft. long. **Improv:** Cabin, 80-ton bunker (1951). **Assays:** High-grade ore \$98.98 per ton. **Prod:** 4 carloads prior to 1901. Shipped to Tacoma smelter in 1949. **Ref:** 14, p. 15. 33, 1907, p. 689. 88, pp. 80-81. 97, 1916, p. 614. 150, p. 34. 162, pp. 87-88.

Lakeview Extension (36)

(see under gold)

Lambert

Loc: Sultan Basin dist. **Owner:** Western Metals Corp. (1928). **Ore:** Copper, silver. **Ref:** 106, 9/1/28.

Last Dollar (148)

Loc: Sec. 8, (28-11E), adjacent to the Bluff prospect, Silver Cr. dist. **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrite. **Deposit:** Vein with 10 in. of ore. **Assays:** 7% Cu, \$18 Au. **Ref:** 14, p. 34. 63, p. 31.

Lida (118)

Loc: Sec. 29, (29-11E), adjoining the Edison property on the NE., Silver Cr. dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, arsenopyrite, pyrite. **Dev:** 15-ft. shaft. **Ref:** 14, p. 34. 63, p. 29.

Little Chief (76)

Loc: N $\frac{1}{2}$ sec. 5, (29-10E). **Elev:** 3,000 to 3,700 ft. **Access:** Near Williamson Cr. trail, 4 $\frac{1}{2}$ mi. from Sultan Basin road.

Prop: 7 patented claims and 2 millsites. **Owner:** Sykes estate, Continental Illinois National Bank & Trust Co., trustee (1943). Stillaguamish & Sultan Mining Co. (1902-1918). **Ore:** Copper, gold, silver, cobalt, nickel. **Ore min:** Chalcopyrite, pyrrhotite, arsenopyrite, copper carbonate. **Gangue:** Quartz, calcite, amphibole. **Deposit:** Quartz 2 to 5 in. wide along fracture zones in quartzite and conglomerate. **Dev:** Two adits, one 410 ft. long, the other 145 ft. long. **Assays:** Tr. Ni in some specimens. **Ref:** 13, p. 167. 14, pp. 48-49. 23, pp. 49-50. 33, 1907, p. 1051. 63, p. 23. 88, p. 68. 98, 1918, p. 136. 158.

Lost Creek (179)

Loc: Secs. 29, 31, and 32, (28-11E), along Lost Cr., Index dist. **Elev:** 3,800 ft. **Access:** Trail up Lost Cr. **Prop:** 15 claims. **Owner:** E. J. Wallace and C. L. Byron, Seattle, Wash. (1912). Lost Creek Mining Co. (1897). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, chalcocite, pyrite. **Gangue:** Quartz, quartzite. **Deposit:** 8-ft. fracture zone in quartzite contains disseminated ore minerals. **Dev:** 3 adits and a 57-ft. shaft. **Assays:** \$4 Au, 2.8 oz. Ag. **Ref:** 14, p. 18. 63, p. 84. 162, pp. 80-81.

Louise

(see Mineral Center under gold)

Lucky Strike (50)

Loc: Sec. 24, (30-9E). **Access:** 32 mi. from railroad at Hartford. **Owner:** Erick Schedin, Silverton, Wash. **Ore:** Copper. **Dev:** Adit. **Ref:** 158.

Lucky Strike (60)

Loc: Sec. 3, (30-9E), on W. side of valley, close to Marten Cr., on Long Mtn. **Elev:** 3,700 to 3,800 ft. **Owner:** Hugh Fox and Ed Owens (1926). **Ore:** Copper, bismuth. **Ore min:** Chalcopyrite, bismuthinite, pyrite, pyrrhotite. **Deposit:** Sulfides in metasediments near contact with granodiorite. **Ref:** 14, p. 44. 158.

M and H No. 2 (149)

(see under gold)

McCombs

(see Jasperson under gold)

Mackinaw (Weden Creek) (89)

Loc: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 19, (29-11E), on W. Fk. Weden Cr., about 3 mi. from Monte Cristo. **Elev:** 3,000 to 3,600 ft. **Access:** 2 mi. road up Weden Cr.; 41 mi. to railroad at Hartford. **Prop:** 18 claims and 3 millsites. **Owner:** Mackinaw Metals Co., Donald Baker, Seattle, Wash. (1944, 1954—). E. C. Baker, Garrett Cleary, M. T. S. Comins (1900). Mackinaw Mining & Milling Co. (1910). Mackinaw Minerals Co. (1934). Utility Mining Co., R. D. Taft, Everett, Wash., lessee (1941-1947). **Ore:** Copper, nickel, cobalt, gold, silver, uranium (?). **Ore min:** Pyrite, chalcopyrite, malachite, chrysocolla, garnierite, erythrite, pyrrhotite, chloanthite, cubanite, pentlandite. **Gangue:** Quartz, carbonates, serpentine. **Deposit:** Mineralized fracture zone that can be traced for 3,000 ft. on the surface and that has a known depth of 125 ft. Ore body is from 11 to 30 ft. wide with a known length of 90 ft. Fracture zone occurs along a fault separating serpentine from arkose. Ore minerals occur as disseminated grains and blebs in serpentine and may total as much as 20% of the rock in spots. The ore shoots are in small lenses. Ore reserves are not large. **Dev:** 4 adits, 255, 146, 686, and 24 ft. long. Also a caved adit and an open cut. **Assays:** 4-ft. sample from a raise in No. 2 adit showed 0.02 oz. Au, 0.25% Ni. Weighted av. of about 30 reliable assays of ore zone av. 13.8 ft. wide, 112 ft. long exposed in No. 3 adit is 2.30% Cu, 0.86% Ni, 0.13 oz. Au. Ore zone around No. 4 and No. 5 adits had a weighted av. of 3 samples of 1.12% Cu, 1.06% Ni, 0.16 oz. Au. The highest cut, 1,000 ft. beyond No. 5 adit, showed 0.20% Cu, 0.99% Ni from a grab sample. A 500-lb.

metallurgical sample supplied by the owner and tested by the U. S. Bureau of Mines showed 2.7% Cu, 1.0% Ni, 0.05% Co, 8.9% Fe, 0.9% As, 3.9% S, 30.6% SiO₂, 0.2% CaO, 0.11 oz. Au, 0.30 oz. Ag. Slight radioactivity in some samples. **Prod:** A few tons shipped 1900-1910. **Ref:** 14, p. 24. 51, p. 11. 157. 158.

Magus

(see "45" under silver)

Mamie (75)

Loc: Sec. 29, (30-10E), about 2 mi. S. of Silverton. **Ore:** Copper. **Prod:** Small amount in 1916. **Ref:** 14, p. 40. 97. 1916, p. 614.

Manley (13)

Loc: SW¼ sec. 27, (32-9E), on Jumbo Mtn., Darrington dist. **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** 3 ft. of chalcopyrite ore. **Dev:** 130-ft. adit. **Assays:** \$8 Au. **Ref:** 14, p. 10. 63, p. 51.

Marguerite Mosher

Loc: Sultan dist. **Owner:** Western Metals Corp. (1928). **Ore:** Copper, silver. **Ref:** 106, 9/1/28; 9/17/28, pp. 5-6.

Martin Engdahl (150)

(see under lead)

Marvel (115)

Loc: SW¼ sec. 2, (28-10E). **Elev:** 3,800 ft. **Access:** Reached by hiking up Elk Cr. from Sultan Basin road. **Prop:** 2 unpatented claims: Marvel, June. **Owner:** C. F. Smith and Vance Curtiss (1937). **Ore:** Copper. **Ore min:** Chalcopyrite, small amounts of pyrrhotite, scheelite, sphalerite. **Gangue:** Quartz. **Deposit:** 2 veins of nearly massive chalcopyrite, one 2 in., the other 1 in. wide separated by 2 in. of altered quartz diorite. **Dev:** 15 ft. of open cut work. **Ref:** 23, p. 74

Merchant (Copper, Empire) (192)

Loc: Center S½ sec. 18, (27-11E), on W. side of Trout Cr. about 4 mi. from its mouth, Index dist. **Elev:** 3,500 ft. **Access:** Trail and road up Trout Cr. **Prop:** 12 unpatented claims including: Fred P., Big Goat, Ore or No Go. **Owner:** J. N. Erlandsen, Everett, Wash. (1950). Skykomish Copper Co. (1929-1930). Ivan Merchant, Salem, Oreg. (1942). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, pyrite, magnetite, hematite. **Gangue:** Quartz, crushed country rock. **Deposit:** 4 shear zones in granodiorite, slate, and quartzite. Shear zones range from a few in. to 12 ft. in width. 80,000 tons of ore in sight. **Dev:** Main adit 1,700 ft. long with drifts. 3 other adits, 150 ft., 500 ft., and 175 ft. long. **Improv:** 2 cabins. **Ref:** 14, p. 18. 63, pp. 34-35. 106, 12/19/29; 5/1/30, p. 20; 7/21/30. 157. 158. 162, pp. 77-78.

Miiki Maru (116)

(see under gold)

Milwaukee (53)

(see under zinc)

Mineral Center (131)

(see under gold)

Mineral Mines (154)

Loc: SE¼ sec. 6, (28-11E). **Access:** 3½ mi. by truck road up Silver Cr. from Galena. **Owner:** Mineral Mines, Inc., Seattle, Wash. (1941). **Ore:** Copper, gold, silver, lead, zinc. **Ore min:** Chalcopyrite, pyrite, galena, sphalerite. **Deposit:** Large mineralized shear zone in limestone. **Dev:** 375-ft. crosscut adit. **Ref:** 14, p. 35. 46, p. 171.

Mint

(see Iowa)

Molly (176)

(see under uranium)

Molly

(see under gold)

Monitor and Sterling (70)

Loc: Sec. 14, (30-9E), on Marten Cr., Silverton dist. **Prop:** 2 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, tetrahedrite. **Deposit:** 30 in. of ore. **Dev:** 20-ft. adit. **Ref:** 14, p. 45. 63, p. 22.

Monte Cristo (95)

(see under gold)

Montezuma (61)

Loc: Sec. 3, (30-9E), Silverton dist. **Prop:** 1 patented claim. **Ore:** Copper. **Ref:** 14, p. 45.

Morning Star (136)

(see under lead)

Mosher

(see Marguerite Mosher)

Mountain Cedar (Paystreak, Mystery) (100)

Loc: Near center sec. 17, (29-10E). **Elev:** 2,000 to 3,500 ft. **Access:** ¼ mi. of trail from Sultan Basin road. **Prop:** 4 unpatented claims. **Owner:** C. F. Smith (1943). **Ore:** Copper, gold, silver, nickel (?). **Ore min:** Pyrite, pyrrhotite, arsenopyrite, chalcopyrite, a little sphalerite, bornite, free sulfur, small grains of chromite. **Gangue:** Quartz, serpentine. **Deposit:** 2- to 10-ft. vein along a shear zone in metamorphic rocks and serpentine. **Dev:** 5 open cuts; 40-ft., 18-ft., 46-ft., 63-ft., and 31-ft. adits. **Assays:** One specimen of ore assayed 5.06% Cu, 0.06 oz. Au, 9.05 oz. Ag, tr. Ni. **Ref:** 14, p. 49. 23, pp. 71-73. 58, p. 47. 129, p. 298.

Myrtle C. (18)

Loc: NE¼ sec. 19, (32-10E), on Gold Mtn., Darrington dist. **Prop:** 9 claims. **Owner:** Burns Mining Co. (1907-1918). **Ore:** Copper, gold, silver, mercury. **Ore min:** Chalcopyrite, tetrahedrite, pyrite, cinnabar, native gold, native mercury. **Deposit:** 7 veins ranging from 9 in. to 6 ft. in width. **Assays:** \$8 to \$26 Au, tr. to 41 oz. Ag, 18% to 36% Cu. **Ref:** 14, p. 10. 33, 1907, p. 400. 63, p. 52. 98, 1918, p. 62.

Mystery (Monte Cristo, Pride)

(see Monte Cristo under gold)

Mystery (Mountain Cedar, Paystreak)

(see Mountain Cedar)

National (126)

Loc: Sec. 31, (29-11E), on E. side of the W. Fk. of Silver Cr. **Elev:** 4,000 ft. **Owner:** E. H. Hubbard, T. D. Brown, and Thomas Lockwood (1892). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, marcasite, arsenopyrite. **Deposit:** 75-ft. porphyry dike slightly mineralized and cut by a more heavily mineralized shear zone. **Dev:** 185-ft. adit, 75-ft. adit, 20-ft. shaft. **Assays:** \$35 to \$300 per ton. **Ref:** 12, pp. 87-88. 13, p. 160. 14, pp. 35-36. 63, p. 30.

Nemo (35)

(see under gold)

Nesta (7)

Loc: Sec. 34, (32-9E), about 3 mi. S. of Darrington, on Jumbo Mtn. **Elev:** 800 to 3,900 ft. **Access:** Within 1 mi. of good county road. **Prop:** 25 claims. **Owner:** Ole and Pete Nesta, Darrington, Wash. (1950). **Ore:** Copper, gold, silver, molybdenum, lead, zinc. **Ore min:** Pyrite, sphalerite, galena. **Deposit:** 10 veins from 2 to 10 ft. wide. Quartz veins 1 to 2 ft. thick in altered diorite. Molybdenum showings are small and scattered and only on the S. part of the claims. **Dev:** 12 adits aggregating 1,150 ft. **Improv:** Good cabin (1950). **Assays:** From \$5 to \$100

for hand samples. Av. values are very low. **Ref:** 14, p. 10. 111, p. 6. 158.

Nevada (85)

Loc: Sec. 12, (29-11E), ¼ mi. SE. of Goat Lk., Monte Cristo dist. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite. **Deposit:** 3- to 10-ft. mineralized fracture zone that carries 3 ft. of good ore and some concentrating ore. **Dev:** 60-ft. adit. **Ref:** 14, p. 24. 63, p. 15.

New Seattle (28)

(see under silver)

New York (51)

Loc: SW¼ sec. 20, (30-10E), Silverton dist. **Ore:** Copper, gold, silver. **Ore min:** Arsenopyrite, chalcopyrite. **Deposit:** 4-ft. vein. **Dev:** 20-ft. adit. **Assays:** \$15 to \$17 Au, Ag, Cu. **Ref:** 14, p. 45. 63, p. 19.

New York-Seattle (137)

Loc: Sec. 4, (28-11E), Silver Cr. dist. **Access:** 13 mi. by poor road to railroad. **Prop:** 8 claims. **Owner:** New York-Seattle Copper Mining Co. (1907-1926). **Ore:** Copper, gold, silver. **Deposit:** 4 veins 4 to 20 in. wide. **Dev:** 212 ft. in shafts, 1,250 ft. of adits. **Assays:** Av. \$14.42 Cu. **Prod:** Shipments of ore were made to the smelter in Everett in 1908. **Ref:** 14, p. 28. 33, 1907, p. 863; 1908, pp. 1039-1040. 97, 1907, p. 475. 98, 1920-1926. 114, no. 4, 1907, p. 55; no. 5, 1909, p. 105. 116, no. 10, 1907, p. 19.

Nickel Bird (52)

Loc: Sec. 21, (30-10E). **Elev:** 3,500 ft. **Access:** 2 mi. by trail from a place on the highway ½ mi. W. of the Big Four Inn. **Prop:** 1 claim (may be the old Hoodoo). **Owner:** Erick Shedden and V. D. McCrory (1942). **Ore:** Copper, lead, silver. **Ore min:** Chalcopyrite, pyrrhotite, argentiferous galena. **Gangue:** Quartz, calcite. **Deposit:** Mineralized fracture zones in conglomerate and argillite. Most of the zones are very narrow, but one is 4 ft. wide. This one pinches out in a distance of 8 ft., however. **Dev:** Drifts and crosscuts on one level total about 1,000 ft. **Ref:** 158.

Non Pareil (186)

Loc: SW¼ sec. 6, (27-11E), on NE. side of Trout Cr., 1 mi. SE. of the Sunset mine, Index dist. **Elev:** 2,500 ft. **Access:** Truck road, 7½ mi. to railroad at Index. **Prop:** 32 claims including: Imperial, Blue Mud, New Lone Star. **Owner:** Non Pareil Consolidated Copper Co. (1903-1912). **Ore:** Copper, gold, silver, cobalt, nickel. **Ore min:** Chalcopyrite, bornite, pyrite, chalcocite, malachite. **Gangue:** Quartz, altered granodiorite. **Deposit:** 4 sparsely mineralized shear zones in granodiorite from 1 to 20 ft. wide. **Dev:** Several open cuts and 1,700 ft. of adit with drifts. **Assays:** Assays are reported to have shown 1.14% Co. **Ref:** 14, p. 18. 111, p. 5. 114, no. 4, 1907, p. 55. 116, no. 5, 1908, pp. 117, 130. 162, pp. 73-74.

North Star (Oldfield, Sunrise)

(see Sunrise under gold)

North Star (196)

Loc: Sec. 4, (27-10E), at the headwaters of North Star Cr., Index dist. **Elev:** 2,570 ft. **Access:** Trail up North Star Cr. **Prop:** 14 claims. **Owner:** North Star Mining Co. (1902-1912). **Ore:** Copper. **Ore Min:** Chalcopyrite bornite, pyrite. **Gangue:** Quartz, crushed and altered granodiorite. **Deposit:** Irregular bands of ore minerals 2 to 3 in. wide occur in a shear zone in granodiorite. **Dev:** 2 adits totaling 1,100 ft. **Ref:** 14, pp. 18-19. 33, 1907, p. 875. 88, p. 82. 162, pp. 86-87.

Northwest Consolidated

(see under gold)

O and B (92)

Loc: Sec. 21 or NW¼ sec. 28, (29-11E), about ½ mi. SW. of Monte Cristo on slope of Silvertip Peak. **Elev:** 4,700 ft. **Access:** Trail from Monte Cristo. **Prop:** 13 unpatented claims: Legal Tender Nos. 1 to 13. **Owner:** A. H. Reiser, 1231 N. 50th St., Seattle, Wash. (1942). Boston American Mining Co. (1902-1934). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, arsenopyrite, pyrite, galena, sphalerite, realgar. **Gangue:** Quartz, calcite. **Deposit:** Ore bodies as much as 4 ft. wide occur in a 2- to 50-ft. fracture zone in andesite. **Dev:** 3 adits connected by raises and a 3,400-ft. crosscut that fails to penetrate ore. **Assays:** \$35 per ton. **Prod:** About 12 carloads of hand-sorted ore were shipped to the Everett smelter prior to 1901. **Ref:** 14, p. 21. 63, pp. 13-14. 88, pp. 72-73. 98, 1918-1926. 112, p. 170. 118. 149, pp. 813, 814. 158.

Occidental (80)

(see under gold)

Oldfield

(see Sunrise under gold)

Olson (54)

Loc: Near S. center sec. 33, (30-10E), on steep SE. slope of Big Four Mtn. **Elev:** 5,000 ft. **Ore:** Copper. **Ore min:** Iron oxides and sulfides, and copper sulfides. **Deposit:** 1-in. to 4-ft. mineralized zone exposed for 200 ft. in slate. Mineralization is mostly very sparse. **Dev:** Adit 40 to 50 ft. long. **Ref:** 158.

Ore Recoveries (40)

(see also Cleveland, Hoodoo, Virginia under copper, and Copper Independent, Eclipse under gold)

Loc: SW¼ sec. 19, (30-10E), at Silverton. **Access:** Road. **Prop:** 14 claims, including Eclipse, Independent, Virginia, Cleveland, Hoodoo. **Owner:** Ore Recoveries Corp. (1942). **Ore:** Copper, gold, silver, arsenic, tin. **Deposit:** Quartz veins. **Dev:** Several thousand ft. of adits, raises, and shafts. **Assays:** Av. \$3 to \$7, with 75% of the value in Au. **Prod:** 200 tons concentrated and shipped to smelter in 1940. **Ref:** 158.

Oro Fino (167)

Loc: SE¼ sec. 20, (28-11E), Silver Cr. dist. **Prop:** 5 claims. **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, native copper. **Deposit:** 7-ft. mineralized shear zone that carries 4 ft. of ore. **Dev:** 80-ft. adit. **Assays:** As high as \$56 per ton. **Ref:** 13, p. 159. 14, p. 36. 63, p. 32.

P. I. (168)

Loc: Sec. 17, (28-11E), about 1 mi. NE. of Galena, Silver Cr. dist. **Ore:** Copper, silver, lead. **Ore min:** Chalcopyrite, galena. **Deposit:** 4-ft. shear zone with 2 ft. of ore. **Dev:** Open cuts. **Assays:** \$26 Ag, \$32 Cu. **Ref:** 14, p. 36. 63, p. 32.

P. and I. (91)

(see under gold)

Palmer

(see under nickel)

Paystreak

(see Mountain Cedar)

Penn

(see Foggy)

Philo (94)

Loc: Sec. 23, (29-11E), on W. side of Cadet Peak, Monte Cristo dist. **Prop:** 3 claims. **Ore:** Gold, silver, copper. **Ore min:** Arsenopyrite, chalcopyrite, pyrite. **Deposit:** Mineralized fracture zone carrying 15 in. of high-grade ore and 2 ft. of concentrating ore. **Dev:** 20-ft. and 40-ft. adits. **Ref:** 14, p. 24. 63, p. 14.

- Pride**
(see Monte Cristo under gold)
- Pride of Index**
(see Lake Serene)
- Queen Anne (14)**
(see under gold)
- Red Cross (Isabell) (159)**
Loc: SE¼ sec. 36, (28-9E), 2 mi. N. of Reiter, Index dist. **Access:** 1 mi. by trail up May Cr. **Prop:** 10 claims. **Owner:** Red Cross Mining Co. (1907-1912). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Quartz. **Deposit:** Veins in granodiorite. **Dev:** Several short adits and open cuts. **Assays:** One sample ran 4% Cu, 0.05 oz. Au, 1 oz. Ag. **Ref:** 14, p. 19. 116, no. 10, 1907, p. 18. 158. 162, p. 92.
- Ruby King (151)**
(see under gold)
- Rudebeck-Florence Rae**
(see Florence Rae)
- Rustler (83)**
Loc: Sec. 11, (29-10E), in a deep canyon, Monte Cristo dist. **Ore:** Copper, molybdenum, lead, zinc. **Ore min:** Pyrrhotite, pyrite, chalcopyrite, molybdenite, galena, sphalerite. **Deposit:** Narrow pinching veins of quartz containing the sulfide minerals. A little molybdenite shows along seams of quartz in one adit. **Dev:** Several short adits and a shallow shaft. **Assays:** Est. 1% to 2% Cu over a width of 1 or 2 ft. In the shaft a 2-ft. width might av. 10% combined Zn, Pb, Cu. **Ref:** 158.
- S. M. P. (155)**
(see under zinc)
- Sadie**
(see Helena and Sadie)
- St. Cloud (62)**
Loc: Sec. 4, (30-9E), Silverton dist. **Ore:** Copper. **Ref:** 14, p. 45.
- St. Louis (156)**
Loc: Sec. 6, (28-11E), on Cascade Gulch, Silver Cr. dist. **Prop:** 4 claims. **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite. **Deposit:** 5- to 15-ft. mineralized shear zone in granite carries 2 to 12 in. of ore. **Dev:** Numerous open cuts. **Assays:** \$5 Cu, \$4 Au, \$3 Ag. **Ref:** 14, p. 36. 63, pp. 29-30.
- St. Louis and Jackson (27)**
Loc: Near center sec. 1, (30-9E), or SW¼ sec. 8, (30-10E) (?), on Deer Cr. about 3 mi. N. of Silverton. **Access:** 3 mi. up Deer Cr. from Silverton, 1¼ mi. from end of road. **Prop:** 4 claims: Calseela, Waine, Kent, Manhattan. **Owner:** Theresa McCormick, Seattle, and W. C. Turk, Grants Pass, Oreg. (1953 —). Conservative Mining Co. (1907-1909). **Ore:** Copper, gold, silver, tungsten. **Ore min:** Chalcopyrite, pyrite, scheelite, tetrahedrite (?). **Gangue:** Sheared granite, quartz. **Deposit:** Well-mineralized quartz vein 1 to 6 in. wide along a shear zone in granite. **Dev:** Adit consisting of 600 ft. of drift and 200 ft. of crosscut, and a 150-ft. adit on the vein 100 ft. higher. **Assays:** 30% Cu, \$20 Au, \$23 Ag. As much as 1½% WO₃. **Prod:** Small amount prior to 1901 and in 1909. **Ref:** 14, p. 40. 33, 1907, p. 992. 63, p. 20. 88, p. 69. 98, 1918, p. 72.
- St. Theresa (108)**
(see under molybdenum)
- Sam Strom (21)**
Loc: Sec. 24, (32-9E), 1 mi. SE. of Darrington. **Access:** 1 mi. by good road to railroad at Darrington. **Prop:** 7 patented claims: Burns, Burns Nos. 2 and 3, Howard Rose, Howard Rose No. 2, Frank, Moline, Moline No. 2. **Owner:** Sam Strom, Darrington, Wash. (1942). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, Chalcopyrite, arsenopyrite. **Gangue:** Quartz and sheared slate and diorite. **Deposit:** Mineralized shear zone in diorite and slate. Zone 500 ft. wide composed of altered country rock and quartz veinlets. Many thousands of tons of ore in sight. **Dev:** 1,000-ft., 600-ft., 500-ft., 250-ft., 175-ft. adits and several open cuts. **Assays:** High-grade ores \$10 to \$30 Au, 3 oz. Ag, 10% Cu. Low-grade ores carry \$5 to \$7 values. **Prod:** Some sorted ore produced. **Ref:** 14, p. 7. 158.
- Scriber**
(see Kromona)
- Seattle**
(see New York-Seattle)
- Seattle**
(see under gold)
- Shirley (169)**
(see under gold)
- Sidney (96)**
(see under gold)
- Silver Coin (66)**
(see under gold)
- Silver Creek**
(see Broken Ridge)
- Silver Horseshoe (55)**
(see under silver)
- Silver Slipper (157)**
(see under gold)
- Skrinde (Kena and Trolly) (170)**
Loc: NE¼ sec. 18, (28-11E), near the Silver Queen property. **Access:** Road up Silver Cr. **Prop:** 5 unpatented claims: Trolly, Trolly Nos. 1 and 2, Betty, Shirley. **Owner:** W. E. Skrinde, Index, Wash. (1939). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite. **Deposit:** Narrow mineralized shear zone in limestone stained brown by limonite. **Dev:** 170-ft. adit. **Ref:** 14, p. 37. 158.
- Sloman**
(see under gold)
- Smith-Way (171)**
Loc: Secs. 17 and 20, (28-11E), 1 mi. up Silver Cr. from its mouth. **Elev:** 1,500 ft. **Access:** 10 mi by road from railroad at Index. **Prop:** 8 unpatented claims: Morning Glory, Vivian, Ione, Ruth, Gladys, Pearl, Maggie, Florence. **Owner:** Frank Smith, Index, Wash. (about 1944). **Ore:** Copper. **Ore min:** chalcopyrite, pyrite, bornite. **Gangue:** Quartz. **Deposit:** Mineralized zone about 10 ft. wide contains many small stringers of sulfides about 250 ft. above the river. 600 ft. above and 1,500 ft. E. of river is a 7-ft. quartz vein strongly mineralized with copper sulfides. **Dev:** Short adit. **Ref:** 157.
- Sterling**
(see Monitor and Sterling)
- Sultan King (Sultan Queen, Hicks) (117)**
Loc: S½ sec. 36, (29-10E) and N½ sec. 1, (28-10E). **Elev:** 3,300 to 5,000 ft. **Access:** 3 mi. trail from end of Sultan Basin road, or old trail from Silver Cr. road 1 mi. to E. **Prop:** 8 patented claims, 8 unpatented claims. **Owner:** Sultan King Mining Co., Seattle, Wash. (1936-1943). **Ore:** Copper, gold, silver, molybdenum. **Ore min:** Chalcopyrite, pyrite, pyrrhotite, marcasite, magnetite, specular hematite, small amounts molyb-

denite and arsenopyrite. **Deposit:** Several quartz veins along fault zones near contact of quartz diorite and metamorphics. One vein 12 to 72 in. wide at least 1,000 ft. long. **Dev:** 1,200 ft. of underground workings in one entry. Several shorter adits and open cuts. **Assays:** 56 assays across the main vein along 500 ft. of its length showed weighted av. of 0.93% to 2.73% Cu, av. 48 in. wide. **Prod:** 24 tons of ore reportedly valued at \$42 per ton shipped to Tacoma smelter in 1920. **Ref:** 14, p. 49. 23, pp. 51-55. 63, p. 25. 97, 1920, p. 268. 104, 7/15/36, p. 30. 129, pp. 298-299. 158.

Sultan Queen

(see Sultan King)

Sunrise (102)

Loc: N. line sec. 15, (29-10E), near summit of Sunrise Mtn. **Elev:** 4,400 to 4,600 ft. **Access:** 2 mi. up Vesper Cr. by trail from Sultan Basin road, by which it is 26 mi. to railroad at Sultan. **Prop:** 4 unpatented claims: Wall Street, Occidental, Quaker City, Eldorado. **Owner:** George Startup, Startup, Wash., and Bob Curtiss, Monroe, Wash. (1947). C. H. Kelly, Monroe, Wash. (1913-1943). **Ore:** Copper, gold, silver, molybdenum. **Ore min:** Chalcopryrite, molybdenite, pyrrhotite, bornite. **Gangue:** Quartz, siderite, brecciated metamorphics. **Deposit:** Quartzite and hornfels in which there are mineralized breccia and quartz veinlets extending outward from a pipe-like breccia mass 500 ft. or more in dia. and exposed to a depth of 350 ft. **Dev:** 45-ft. adit, 255-ft. adit, 35-ft. adit, 850-ft. adit, 3 open cuts. **Assays:** 2% to 4% Cu, 0.02 to 0.05 oz. Au, 0.4 to 4.8 oz. Ag from selected samples. Av. of deposit as a whole would be less than 1% Cu, 0.02% Mo. **Ref:** 14, p. 50. 23, pp. 68-70. 111, p. 9. 158.

Sunrise (9)

(see under gold)

Sunset (183)

Loc: Sec. 1, (27-10E) and sec. 6, (27-11E), on N. side of Trout Cr. about 6 mi. NE. of Index. **Elev:** 1,399 ft. **Access:** 7 mi. by road from railroad at Index. **Prop:** 19 patented claims, 8 unpatented claims, and deeded land, totaling 960 acres. **Owner:** Index Mining Co., Seattle, Wash. (1946—) leasing to Granore Co. (1955—). Ezra and Arthur Egbert (1897). Sunset Copper Co. (1902-1935). Sunset Syndicate Corp. (1936-1937). Kromona Mines Corp. (1941-1943). **Ore:** Copper, gold, silver. **Ore min:** Bornite, chalcopryrite, covellite, pyrite, chalcocite, native copper, native silver. **Gangue:** Quartz, calcite. **Deposit:** 5 main shear zones in granodiorite, with lenses of ore a few in. to 16 ft. wide. Footwall usually well developed, hanging wall ill defined. **Dev:** 5 levels with about 12,000 ft. of workings, a 365-ft. winze. Lower 3 levels were flooded in 1942. 3,746 ft. of diamond drilling by U. S. Bureau of Mines in 1950. **Assays:** Av. of all production is 2.45% Cu, 0.59 oz. Ag, 0.0057 oz. Au. **Prod:** 1902-1905, 1907, 1916-1930. From November 1926 to July 1929 there were 193,112 tons of ore produced. Since that time only small shipments of high-grade ore have been made. Produced 1931, 514 tons; 1936-1940, \$74,418; 1946, one carload from dump; 1949, 84 tons ore. Total production is 1,500 oz. Au, 156,000 oz. Ag, 12,912,000 lb. Cu from 263,500 tons of ore. **Ref:** 7-A, p. 12. 14, p. 16. 33, 1907, p. 1058. 43, 1927, p. 212. 88, pp. 79-80. 91, p. 248. 97, 1907, 1916-1931, 1937-1945, 1947, 1950. 98, 1918-1926. 99, 1/29/35. 104, 7/15/34, p. 26; 4/15/36, p. 27; 6/30/36, p. 25; 10/30/36, p. 33. 106, no. 14, 1920, p. 5; 2/4/32, p. 4. 112, p. 205. 113, 6/34, p. 5. 114, no. 4, 1907, p. 55; no. 5, 1909. 129, pp. 282-290. 130, p. 63. 141, pp. 20, 22. 150, p. 33. 152-B. 158. 159, p. 135. 162, pp. 71-73.

Threadwell

(see under gold)

Treasure Box

(see Horseshoe and Treasure Box under gold)

Troly

(see Skrinde)

Uncle Sam (193)

Loc: Sec. 23, (27-10E), on S. slope of the divide between Lewis and Barclay Creeks, Index dist. **Elev:** 3,200 ft. **Access:** 4-mi. trail from Index or a 3-mi. trail from Baring. **Prop:** 4 claims: Zenith, Baring Star, Barclay Bluffs, Minoka. **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, bornite, pyrite, hematite. **Gangue:** Quartzite, garnet, hornblende. **Deposit:** Mineralized shear zone from 10 to 12 ft. wide in quartzite. **Dev:** 3 adits totaling 400 ft. **Assays:** Picked samples ran from 3% to 4.5% copper, with small amounts of gold and silver. **Ref:** 13, p. 149. 14, p. 19. 162, pp. 81-82.

Vesper Peak

(see "48-55")

Victory

(see under gold)

Virginia (39)

(see also Ore Recoveries)

Loc: SW¼ sec. 19, (30-10E), at Silverton. **Access:** Road. **Prop:** One of a group of 14 claims. **Owner:** Ore Recoveries Corp. (1942). Virginia-Agenda Co. (1922-1930). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, arsenopyrite. **Dev:** Several thousand ft. of adits, raises, and shafts. **Ref:** 14, p. 45. 97, 1930, p. 675. 98, 1922-1926.

Washington-Iowa (132)

(see also Mineral Center under gold)

Loc: Sec. 32, (29-11E), Silver Cr. dist. **Owner:** Mineral Center Mining Co. (1924-1951). Washington-Iowa Copper Mining Co. (1907-1918). **Ore:** Copper, lead, zinc, gold, silver. **Ref:** 33, 1908, p. 1414. 98, 1918-1926. 105, 1910, p. 63. 112, p. 209. 116, no. 1, 1907, p. 18.

Way

(see Smith-Way)

Wayside (63)

Loc: SE¼ sec. 8, (30-7E), 1½ mi. E. of Granite Falls. **Elev:** 1,200 to 1,500 ft. **Access:** 1½ mi. above the Yankee Boy property by road. 10 mi. from railroad at Hartford. **Prop:** 15 patented claims. **Owner:** Wayside Copper Co., Seattle, Wash. (1955—). Wayside Mining Co. (1905). American Copper Co. (1924). Riverside Minerals Co. (1928). Vanguard Metals, Inc., Everett, Wash. (1936-1939). F. G. DeShane, Seattle, Wash. (1943-1955). **Ore:** Copper, gold, silver, lead, zinc, vanadium. **Ore min:** Chalcopryrite, pyrite, galena, sphalerite, bornite. **Gangue:** Cherty quartz. **Deposit:** Vein 6 to 18 in. wide cutting slates and siliceous limestone. **Dev:** Shaft and 7 levels, 6 under water. **Assays:** 0.01 to 0.25 oz. Au, 6 to 10 oz. Ag, 10% Cu. The reported occurrence of vanadium has not been verified. **Prod:** About \$500,000 worth of high-grade ore shipped. **Ref:** 7-A, p. 17. 14, p. 13. 40, p. 37. 97, 1905, 1919, 1924, 1928. 104, 12/30/36, p. 29. 158.

Wayside (Armament) (177)

(see Armament)

Webster

(see Jasperson under gold)

Weden Creek

(see Mackinaw)

Westland (158)

Loc: Sec. 7, (28-11E), on W. side of Silver Cr. **Prop:** 5 claims. **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite, arsenopyrite. **Deposit:** One mineralized shear zone from 8 to 12 ft. wide exposed for 900 ft. A 20- to 30-ft. shear zone with 10 ft. of concentrating ore. A 4-ft. mineralized shear zone exposed for 300 ft. **Dev:** 47-ft. adit, 10-ft. adit, 50-ft. adit. **Assays:** \$18 and \$36. **Ref:** 14, p. 38. 63, p. 32.

Whaleback (128)

(see under gold)

Whistler (90)

(see under lead)

White Gander (8)

Loc: NW¼ sec. 34, (32-9E), Darrington dist. **Prop:** 2 claims. **Owner:** Messrs. Burns and Neste (1901). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, arsenopyrite. **Deposit:** 3 ft. of ore. **Dev:** 15-ft. adit, two open cuts. **Assays:** \$15 to \$20 per ton. **Ref:** 14, p. 11. 63, p. 51. 88, p. 63.

Whitehorse (1)

(see under zinc)

Wilbur Index

(see Lake Serene)

Wild Rose (133)

Loc: Sec. 32, (29-11E), on Silver Cr. about 200 yd. upstream from Molybdenum Gulch. **Elev:** 3,000 ft. **Owner:** Bonanza Mining Co. (1901). **Ore:** Copper, mercury, cobalt, arsenic, nickel, gold, silver. **Deposit:** Rusty mineralized zone along contact of peridotite with slaty quartzite. **Dev:** Adit. **Ref:** 58, p. 73. 149, p. 830.

Winnie (127)

Loc: Sec. 31, (29-11E), just E. of the National prospect, Silver Cr. dist. **Owner:** E. H. Hubbard et al. (1892). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopyrite. **Deposit:** 8-ft. shear zone with 4 ft. of ore. **Dev:** 10-ft. shaft. **Assays:** \$56 Au, Ag. **Ref:** 13, p. 161. 14, p. 38.

Winter Coon (38)

(see under gold)

Yankee Boy (65)

Loc: NE¼ sec. 18, (30-7E), 0.9 mi. E. of Granite Falls. **Access:** 9 mi. from railroad at Hartford. **Owner:** Orie Smith, Everett, Wash. (1949). Stilaguamish Mining Co. (1930-1931). Yankee Boy Mining Co. (1932-1933). Miners Smelting & Refining Co. (1934). **Ore:** Copper, gold, lead, zinc. **Ore min:** Malachite, sphalerite, pyrite, galena. **Gangue:** Quartz, calcite. **Deposit:** Shear zone in limestone and serpentine contains a few quartz and calcite stringers and is stained with malachite. Some sphalerite in the ore. **Dev:** 300-ft. adit along the shear zone. **Ref:** 14, p. 13. 79, 97, 1930, p. 675. 104, 9/15/32, p. 29; 10/15/33, p. 18; 4/30/34, pp. 21-22. 106, 3/5/31. 111, p. 7. 158.

Zeta (134)

(see under gold)

STEVENS COUNTY**A and C (Smoky Bullion, Bruce Creek) (106)**

Loc: NE¼ sec. 3, (37-39E), on divide between Clugston Cr. and the E. branch of Bruce Cr., Northport dist. **Elev:** 3,450 ft. **Access:** Road. **Prop:** 160-acre State lease. **Owner:** E. B. Gibbs, Colville, Wash., lessee, (1944). J. D. McDonald and William Hammel, Colville, Wash., lessees, (1941). **Ore:** Copper, zinc, lead, silver, gold. **Ore min:** Chalcopyrite, sphalerite, pyrite, galena. **Gangue:** Limestone. **Deposit:** Ore minerals replace

limestone in a zone 2 to 12 ft. wide, 6 ft. from a granite contact. **Dev:** 220-ft. adit and a 110-ft. adit from which there has been some drifting. Also a shaft and open cut. **Assays:** 96 tons produced in 1941 yielded \$1,919. **Prod:** 1941 (96 tons), 1943, 1944. **Ref:** 30, p. 83. 46, p. 52. 164, pp. 241-242.

Abe Lincoln (22)

(see under gold)

Acme (128)

(see under lead)

Admiral (193)

Loc: NW¼ sec. 28 and NE¼ sec. 29, (31-39E), near junction of Deer and Meadow Creeks, Chewelah dist. **Access:** 12 mi. by road W. of Valley. ¼ mi. E. of the County road by truck road. **Prop:** 8 claims. **Owner:** Admiral Consolidated Mining Co., Spokane, Wash. (1918-1934). Phillip Creasor (1898-1900). Tate and Greenway (1900-1916). Admiral Mining Co. (1916-1918). **Ore:** Copper, silver, lead. **Ore min:** Chalcopyrite, chalcocite, tenorite. **Deposit:** A quartz vein as much as 14 in. wide parallels the lamination of schist. A diorite dike intrudes the schist nearby. **Dev:** 3 adits, several open cuts and shallow shafts total about 6,000 ft. of underground workings. **Assays:** 4.5% to 6.6% Cu, 2.5 to 4.5 oz. Ag, up to 0.04 oz. Au. **Prod:** 1915, 1916, 1930, 1932. Total probably \$10,000. **Ref:** 30, p. 32. 58, p. 2. 97, 1916, p. 616; 1917, p. 507. 98, 1918-1926. 104, 5/15/32, p. 26; 7/15/33, p. 19. 105, 1922, p. 276. 106, no. 14, 1924, p. 3; 11/6/30, 5/15/32, p. 26. 112, 1918, p. 163. 117, no. 13, 1917, p. 4. 141, p. 22. 164, pp. 182-184.

Aguila (129)

(see under lead)

Aichan Bee (212)

(see under silver)

Aladdin (116)

(see under lead)

Aladdin (Blue Ridge, Sierra Zinc)

(see Sierra Zinc under zinc)

Alandale (185)

Loc: Sec. 36, (33-39E), Chewelah dist. **Elev:** 2,600 to 2,680 ft. **Access:** Road. **Prop:** 4 unpatented claims. **Owner:** James Platt, Bluecreek, Wash. (1941). **Ore:** Copper. **Ore min:** Chalcopyrite, secondary copper minerals. **Gangue:** Quartz. **Deposit:** Argillite and schist cut by quartz veins. At least two veins, both of which are 4 ft. wide. **Dev:** 570-ft. adit, 83-ft. adit, 40-ft. adit, 110-ft. shaft. **Ref:** 30, p. 42. 164, pp. 165-166.

Alberta (213)

Loc: Sec. 3, (28-37E). **Access:** ½ mi. E. of road. **Prop:** Indian Reservation land leased by James Keith, Spokane, Wash. (1943). **Ore:** Copper, silver. **Ore min:** Malachite. **Gangue:** Quartz. **Deposit:** Slightly mineralized zone exposed for 1,500 ft., part of which is at argillite-granite contact. **Dev:** 2 shallow shafts. **Assays:** Owner reports one sample showed 3.3% Cu, 1 oz. Ag. **Ref:** 157.

Alert

(see under gold)

Alice

Loc: Chewelah dist. **Owner:** Alice Gold Mining Co. (1903-1908). **Ore:** Copper, silver, gold. **Ref:** 158.

Amazon (143)

(see also Chinto)

Loc: Secs. 29 and 32, (33-41E), Chewelah dist. **Prop:** 3 patented claims. Part of Chinto property. **Owner:** Chewelah Copper Co., Colville, Wash. (1953—). Amazon Mining Co.

(1918-1926). United Mines Corp. (1926). B. Oppenheimer, c/o A. I. Kulzer, Chewelah, Wash. (1950). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, azurite, limonite. **Deposit:** Quartz vein 2 to 16 ft. wide along bedding faults in argillite. **Dev:** 650 ft. of tunnel work and 310 ft. of drifts. **Improv:** 200-ton flotation mill at Palmers (1955). **Assays:** Values said to be 2½% Cu, 2 to 37 oz. Ag, 50¢ to 60¢ Au. 2 cars of oxide ore yielded \$841 Cu and \$125 Ag. **Prod:** \$6,212 to 1914. 1915-1917. 2,000 tons of ore from this and United Copper claim in 1954. 1955. **Ref:** 158. 164, pp. 150-151.

American Boy (95)

(see under gold)

Anaconda (55)

(see under lead)

Antelope (75)

(see under gold)

Ark (125)

(see under silver)

Audrey M. (94)

Loc: Sec. 31, (39-37E), between Orient and Copper Butte properties, Orient dist. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, pyrrhotite, pyrite. **Deposit:** Calcareous argillite and quartzite cut by monzonite dikes. A fracture zone in the series is mineralized with pyrite, pyrrhotite, and chalcopyrite. **Dev:** 18-ft. shaft, open cuts. **Assays:** Reportedly \$23 Cu, Au. **Ref:** 30, p. 131. 164, p. 268.

Austin

(see Aichan Bee under silver)

Avondale-Dome (111)

(see under lead)

B and B (176)

Loc: SW¼ sec. 32 or NE¼ sec. 31, (32-40E), ½ mi. SE. of Browns Lk. **Access:** 11 mi. by road SW. of Chewelah. **Prop:** 40 acres of deeded land. **Owner:** Henry Brosier (1941). **Ore:** Copper, gold, silver. **Ore min:** Cuprite, malachite, azurite. **Gangue:** Quartz, calcite, limonite. **Deposit:** Quartz-calcite vein in dolomite. **Dev:** 28-ft. crosscut adit from which a 42-ft. drift has been driven. Stopped 30 ft. to surface. **Prod:** 1917. **Ref:** 30, pp. 43-44. 97, 1917, p. 505. 164, pp. 185-186.

Bald Eagle (11)

(see under gold)

Banner

(see Chinto)

Banshee (171)

Loc: Secs. 22 and 27, (31-41E), Chewelah dist. **Owner:** Admiral Mining Co. (1915). **Ore:** Copper, silver, lead. **Prod:** 1907, 1910. **Ref:** 97, 1908, p. 581; 1911, p. 788.

Baxter

(see Snyder and Baxter under silver)

Bear Canyon (134)

Loc: NW¼ sec. 12, (34-40E), Chewelah dist. **Access:** Poor road. **Prop:** Several claims. **Ore:** Copper, silver. **Deposit:** Quartz vein. **Dev:** 800 ft. of shaft and adit. **Ref:** 30, p. 41.

Beecher (20)

(see under gold)

Belcher (141)

Loc: Sec. 33, (33-41E), on W. spur of Eagle Mtn., Chewelah dist. **Elev:** 2,900 ft. **Access:** Road. **Prop:** 7 claims, now part of Chinto mine. **Owner:** Eagle Mountain Mining Co. (1949).

Belcher Group Development Co. (1908). **Ore:** Copper, lead, silver, gold. **Ore min:** Chalcopyrite, chalcocite, galena. **Gangue:** Quartz, siderite. **Deposit:** Quartz veins cutting a series of limestones and argillites. One vein is 4 ft. wide and carries chalcocite and chalcopyrite. The others are 3 in. to 6 ft. wide, one carries galena. **Dev:** 420-ft. adit, 135-ft. shaft, 12-ft. shaft, other short adits and shafts. **Ref:** 30, p. 39. 116, no. 6, 1908, p. 122. 164, pp. 146-147.

Benvenue

(see Gold Reef under gold)

Big Bear (119)

Loc: NE¼ sec. 4, (36-38E), on N. side of Pingstone Cr. Kettle Falls dist. **Elev:** 2,630 ft. **Access:** 5 mi. from Marcus. **Prop:** 1 claim, abandoned during 1941. **Ore:** Copper. **Deposit:** Quartz stringer in argillite. **Dev:** 300-ft. adit, 195-ft. adit from which a 105-ft. shaft has been sunk. **Ref:** 30, p. 56. 164, p. 232.

Big Iron (38)

(see under iron)

Big Jim (71)

(see under gold)

Birton

(see under gold)

Black Horse

(see Columbia Tungsten under tungsten)

Blanche

(see under silver)

Bland

(see under lead)

Bliss

(see Galena Hill under lead)

Blue Bird (72)

(see under gold)

Blue Creek

Loc: About 1½ mi. from the station of Blue Creek on the Great Northern Ry., Chewelah dist. **Prop:** 3 claims. **Owner:** Blue Creek Copper Mining Co. (1902-1908). **Ore:** Copper. **Deposit:** 6-ft. vein. **Dev:** 300 ft. of underground workings. **Assays:** \$26.76 Cu. **Ref:** 33, 1908, p. 383. 88, p. 7.

Blue Goose (25)

Loc: Sec. 29, (40-37E), Orient dist. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Pyrite and subordinate chalcopyrite. **Gangue:** Quartz. **Deposit:** Mineralized vein along quartzite-brecciated limestone contact. **Dev:** Small open cuts. **Ref:** 30, p. 124. 164, p. 281.

Blue Grass (89)

(see under gold)

Blue Ridge

(see Sierra Zinc under zinc)

Blue Star

(see Eagle under silver)

Bluebird

(see Loon Lake Copper)

Bonanza (102)

(see under lead)

Bonanza Copper (Maryland) (202)

Loc: Sec. 32, (30-38E), about 1 mi. N. of the Germania mine, Cedar Canyon dist. **Access:** On the old Deer Trail road near summit of the Huckleberry Range. **Prop:** Several unpatented claims. **Owner:** Bonanza Copper Co. (1916-1941). **Ore:** Copper,

reportedly silver and gold. **Ore min:** Chalcopyrite, bornite, malachite, pyrite. **Gangue:** Quartz, calcite. **Deposit:** Zones in argillite and schist have been replaced by mineralized quartz veinlets. Widest zone was 5 ft. Quartz veinlets vary from a few in. to 2 ft. in width. **Dev:** 2 adits with drifts comprise 1,200 ft. of underground workings. **Prod:** One small shipment in 1916. **Ref:** 30, p. 74. 97, 1916, p. 616. 129, pp. 151-152. 158.

Boundary Line (1)

Loc: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, (40-36E), on E. side of Kettle R. near international boundary line, Orient dist. **Elev:** 1,500 ft. **Ore:** Copper. **Ore min:** Pyrite, chalcopyrite. **Deposit:** Argillite exposed for about 300 ft. along the river is mineralized with pyrite and chalcopyrite. **Ref:** 158.

Brooks (209)

(see under silver)

Brown's Lake (177)

Loc: NW $\frac{1}{4}$ sec. 30, (32-40E), Chewelah dist. **Ore:** Copper. **Prod:** 1916, 1917. **Ref:** 97, 1917, p. 505; 1918, pp. 508-509.

Bruce Creek

(see A and C)

Bryant (17)

Loc: SW $\frac{1}{4}$ sec. 36, (40-36E), Orient dist., $\frac{1}{2}$ mi. NE. of Rockcut. **Elev:** 2,120 ft. **Prop:** 1 unpatented claim. **Owner:** George Bryant, Orient, Wash. (1941). **Ore:** Copper, gold. **Ore min:** Chalcopyrite. **Deposit:** Gneiss, cut by serpentinized basic dikes, is traversed by fracture zones which have been slightly mineralized. **Dev:** 30-ft. adit, 125-ft. adit, 85-ft. shaft, 12-ft. shaft, and some open cuts. **Ref:** 30, p. 130. 164, p. 290.

Buck Mountain

(see under silver)

Bullion (66)

(see under lead)

Burrus (115)

(see under zinc)

Centennial (78)

Loc: Sec. 19, (39-38E). Adjoins the Minorca claim on NE., Orient dist. **Prop:** 1 claim. **Owner:** Centennial Mines Co. (1924-1926). Minorca-Homestake Mines Co. (1922). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrrhotite, arsenopyrite. **Gangue:** Quartz. **Deposit:** Limestone and argillite are cut by an andesite dike. A 4-ft. quartz vein follows the limestone-andesite contact. Other smaller veins nearby. **Dev:** 65-ft. inclined shaft. **Assays:** \$38 Cu, Au, Ag. **Ref:** 63, p. 107. 98, 1925, p. 1808; 1926, p. 1573. 106, no. 2, 1924, p. 8. 164, p. 255.

Chamokane (198)

Loc: Secs. 9, 10, 11, and 15, (30-38E), near headwaters of Chamokane Cr., Cedar Canyon dist. **Access:** Road from Springdale. **Prop:** 38 claims, believed abandoned (1941). **Owner:** Security Copper Co. (1918-1926). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite. **Gangue:** Quartz, barite. **Deposit:** 3 main quartz veins in argillite. Two 4-ft. and one 18-in. vein along bedding planes in argillite. **Dev:** 50-ft. adit, 170-ft. adit, several open cuts. **Ref:** 30, p. 73. 98, 1918-1926. 164, pp. 211-212.

Checops (Sprague) (179)

Loc: Sec. 24, (32-39E), Chewelah dist. Adjoins Pacific Copper on the W. **Elev:** 2,950 ft. **Access:** Road. **Prop:** 80 acres of deeded land. **Owner:** Northwest Magnesite Co., Chewelah, Wash. (1941). Checops Copper Mining Co. (1920). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, limonite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Quartz-calcite-siderite vein cutting series of quartzites and argillites intruded by diabase. **Dev:** 200-ft. adit, shaft, short adit. **Ref:** 30, p. 43. 112, p. 172. 164, p. 167.

Chewelah Consolidated (135)

(see under lead)

Chewelah Eagle

(see Eagle under silver)

Chewelah Standard (Nellie S.) (159)

Loc: N. part sec. 7, (32-41E), $1\frac{1}{2}$ mi. E. of Chewelah. **Prop:** 5 claims. **Owner:** Chewelah Standard Mining Co., Spokane, Wash. (1916-1920). **Ore:** Copper, silver, gold, molybdenum. **Ore min:** Chalcopyrite, molybdenite. **Deposit:** 3 quartz veins, one along contact of schist and granite, the others in granite. Ore minerals occur in the quartz and associated pegmatite dikes. **Dev:** 60-ft. shaft, 30-ft. shaft, adit. **Assays:** Ore shipped to smelter returned \$6 Au, Ag. **Prod:** 1 carload of ore shipped in 1915. **Ref:** 97, 1916, p. 614. 164, pp. 156-157.

Chinto (Banner) (144)

(includes Amazon, Copper King, and Independent Keystone, which see)

Loc: Near center N $\frac{1}{2}$ sec. 32, (33-41E). **Elev:** 3,040 ft. **Access:** 6 mi. by road to railroad at Chewelah. **Prop:** 3 patented, 11 unpatented claims, and 1 millsite. **Owner:** Eagle Mountain Mining Co. (1949). Chinto Mining Co. (1938-1944). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, tetrahedrite, sphalerite, pyrite, arsenopyrite, malachite, azurite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Several quartz-calcite-siderite veins along faults parallel to bedding in argillite. Ore occurs as lenses and disseminations, also disseminated in the argillite. **Dev:** 1,500-ft. adit, 350-ft. shaft, total 7,000 ft. of workings on 3 levels. **Improv:** 25-ton flotation mill (1940). **Assays:** Ore produced from upper two levels av. \$12.59 Ag, Cu, Au. 8 cars of sorted crude ore ran 12% to 15% Cu, 80 oz. Ag. **Prod:** Copper King 1904, 1909, 1912-1913, 1915-1917. Amazon 1910, 1915-1917. Chinto 1938, 1939 (130 tons), 1940 (8 cars crude ore, 400 tons conc.), 1941 (1,587 tons). Total production is probably about 50,000 tons of ore. **Ref:** 7, pp. 102-104. 13, p. 156. 30, p. 31. 33, 1907, p. 473; 1908, p. 521. 97, 1905, 1910, 1911, 1913, 1914, 1916, 1917, 1918, 1930, 1939-1941. 98, 1918-1926. 112, pp. 165, 172, 187. 114, no. 5, 1909, p. 57. 116, no. 9, 1907, p. 18. 117, no. 1, 1922, p. 41. 129, pp. 131-135. 158. 164, pp. 142-144, 150-151. 164-A, p. 123.

Chloride Queen (110)

(see under lead)

Churchill (39)

Loc: Sec. 30, (40-38E), Orient dist. **Access:** Near road. **Prop:** Several unpatented claims. **Owner:** Mr. Powell, Northport, Wash. (1941). **Ore:** Copper, gold. **Gangue:** Quartz, talc. **Deposit:** Mineralized zone about 8 ft. in width. **Dev:** Shaft with 300 ft. of work. **Ref:** 30, p. 136. 63, p. 107.

City View (124)

(see under gold)

Clara (53)

(see under gold)

Clugston

(see Silver Trail under lead)

Coffer (Copper-Gold) (87)

Loc: Sec. 28, (39-37E), on E. side of the Elmo claim on W. slope of Jumbo Mtn., Orient dist. **Elev:** 2,865 ft. **Prop:** 1 claim. **Owner:** Abandoned (1941). **Ore:** Copper, lead, gold. **Ore min:** Pyrite, chalcopyrite, galena. **Deposit:** Fracture zones in argillite slightly mineralized. **Dev:** 300-ft. adit with 60-ft. inclined shaft and 40-ft. drift at face. Also open cuts. **Ref:** 30, p. 134. 164, p. 273.

Columbia

(see Iroquois under zinc)

Columbia River (122)

Loc: NE¼ sec. 7 or NW¼ sec. 8, (36-38E). **Elev:** 1,675 to 2,525 ft. **Access:** 3 mi. SE. of Marcus by road. **Prop:** 2 claims. **Owner:** Columbia River Gold Mining Co. (1905-1914). Abandoned (1941). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, tetrahedrite, molybdenite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Vein 3 to 6 ft. wide in shale and limestone consists of brecciated country rock cemented by gangue minerals. Ore shoots as much as several in. wide and several ft. long. **Dev:** 2,700-ft. adit and several laterals at 1,675 ft. Inclined shaft said to be 300 ft. deep at elev. of 2,525 ft. **Prod:** Small production in 1904 and 1910 valued at \$1,500. **Ref:** 7, pp. 124-125. 30, pp. 56-57. 33, 1907, p. 490; 1908, p. 544. 97, 1905, p. 337; 1910, p. 605. 158. 164, p. 233-234.

Columbia Tungsten (188)

(see under tungsten)

Colville Queen

(see Chloride Queen under lead)

Comstock (9)

Loc: W½ sec. 25 and E½ sec. 26, (40-36E), a short distance E. of Kettle R., Orient dist. **Prop:** 4 claims: Comstock, Homestake, Red Fox, Red Cross. **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, pyrrhotite, galena. **Deposit:** Country rock is quartzite and gneissoid granite. The ore occurs in a 5-ft. mineralized zone and 2 quartz veins 4 and 6 ft. wide. **Dev:** 15-ft., 30-ft., 64-ft. shafts, 60-ft. adit. **Assays:** Mineralized zone \$5 to \$35 Au, Cu, Ag. 6-ft. vein, 3½% Cu, 22 oz. Ag, \$1.30 Au. **Ref:** 164, pp. 288-289.

Contention

(see Mountain View under silver)

Copper Butte

Loc: Orient dist. **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, limonite. **Deposit:** Mineralized fracture zone 4 ft. wide in limestone near contact with an aplite dike. **Dev:** 2 shafts, one 90 ft. deep. **Ref:** 114, no. 5, 1909, p. 61. 164, p. 281.

Copper Butte (97)

Loc: SE¼ sec. 31, (39-37E), 3 mi. SE. of Orient, on SW. slope of Toulou Mtn., less than ½ mi. NE. of Globe prospect. **Elev:** 1,800 to 2,930 ft. **Access:** Road. **Prop:** 4 patented claims. **Owner:** B. B. Hamilton, Orient, Wash. (1941). Copper Butte Mining Co. (1915). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, pyrite. **Gangue:** Quartz. **Deposit:** Mineralized breccia and gouge along a fault in quartzite, argillite, and limestone near contact with monzonite. **Dev:** 1,200-ft. crosscut adit, 300-ft. shaft with short drifts on 3 levels, 100-ft. shaft with a 100-ft. drift. **Assays:** Specimen assays said to run \$15 to \$18 Au. **Ref:** 7, p. 79. 30, p. 125. 164, pp. 267-268.

Copper Butte (Shallenberger) (196)

Loc: SW. cor. sec. 11 and NW¼ sec. 14, (30-38E), Springdale area. **Elev:** 3,610 ft. **Access:** Road. **Prop:** 4 unpatented claims. **Owner:** H. H. Shallenberger, Spokane, Wash., leasing to Earl Fields et al. (1942). Security Copper Co. (1918-1926). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, pyrrhotite, pyrite. **Gangue:** Quartz, barite. **Deposit:** Barite vein 4 to 6 ft. wide along the laminations of argillite contains sparsely disseminated ore minerals. **Dev:** 180-ft. adit with winze at face said to be 150 ft. deep, open cuts. **Assays:** Ore shipped av. 3.8% Cu. **Prod:** 5 cars. Several hundred tons of barite is reported to have been produced. **Ref:** 30, p. 63. 97, 1916, p. 616; 1917, p. 507. 98, 1918-1926. 157. 164, pp. 209-210.

Copper Cliff (167)

Loc: SE¼ sec. 17, (32-41E), Chewelah dist. **Owner:** Copper Cliff Copper Mining Co. (1917-1924). **Ore:** Copper. **Ref:** 158.

Copper-Gold

(see Coffer)

Copper Jack (26)

Loc: Secs. 29 and 32, (40-37E), Orient dist., about 4 mi. E. of Rockcut. **Prop:** 3 unpatented claims. **Owner:** Abandoned (1941). Northwestern Gold & Copper Mining Co. (1918). **Ore:** Copper, gold. **Ore min:** Chalcopyrite and a little pyrite. **Gangue:** Quartz. **Deposit:** A 1-ft. vein. **Dev:** 25-ft. and 10-ft. shafts. **Ref:** 30, p. 126. 112, p. 195. 164, p. 278.

Copper King (145)

(see also Chinto)

Loc: Sec. 32, (33-41E), Chewelah dist. **Elev:** 3,041 to 3,330 ft. **Prop:** Part of Chinto property. **Owner:** Banner Mining Co. (1950). Copper King Mining Co. (1905-1907, 1920-1924). Chewelah Copper King Mining Co. (1907-1915). United Copper Co. (1916-1918). Copper Queen Mining Co. (1918). King Mining Co. (1918). United Mines Corp. (1926). Northwest Mines Corp. (1930). **Ore:** Copper, silver. **Deposit:** Said to be a body of low-grade ore 40 ft. wide and 500 ft. long. **Dev:** Shaft, short intermediate level, and lower adit 1,160 ft. long. **Assays:** 4,000 tons from No. 2 level av. 2½% Cu, 3 oz. Ag, \$1.00 Au. Low-grade ore remaining showed an av. of 0.32% Cu, 0.21 oz. Ag in 8 samples. **Prod:** 1904, 1909, 1912, 1913, 1915-1917. **Ref:** 158.

Copper King (56)

(see under lead)

Copper Queen (137)

Loc: Sec. 6, (33-41E), on Chewelah Cr. **Elev:** 2,300 to 2,500 ft. **Access:** 10 mi. N. of Chewelah by road. **Prop:** 5 claims: Silver Tip, West Side, Black Bear, Ellis G., Mary L. **Owner:** R. C. Thomason, Chewelah, Wash. (1950). **Ore:** Copper, silver. **Ore min:** Pyrite, chalcopyrite, tetrahedrite. **Gangue:** Quartz, calcite. **Deposit:** Small lenticular and irregularly spaced quartz veins in quartzite and conglomerate. Veins sparsely mineralized, as is the calcite cement in the conglomerate. **Dev:** Several short adits, drifts, and winzes aggregate about 600 ft. of underground development. **Ref:** 7, pp. 108-109.

Copper Queen (147)

Loc: SW¼ sec. 29, (33-41E), on Eagle Mtn. **Elev:** 2,800 ft. **Access:** 7 mi. NE. of Chewelah. **Prop:** 2 claims and 80 acres of deeded land. **Owner:** Mr. Durkee, Chewelah, Wash. (1950). Aurora Mining Co. (1915). Northwestern Gold & Copper Mining Co. (1918). Copper Queen Mining Co. (1918). Aurora Copper Mining Co. (1918-1924). United Mines Corp. (1926). Northwest Mines Corp. (1930). **Ore:** Copper, silver, gold, lead. **Ore min:** Chalcopyrite. **Gangue:** Quartz, siderite. **Deposit:** 4-ft. quartz-siderite vein in argillite. 600 ft. from portal of the main adit. **Dev:** 3 crosscut adits total 1,200 ft. in length. **Assays:** Low-grade ore. **Prod:** Has produced. **Ref:** 30, p. 32. 58. 97, 1930, p. 675. 98, 1918-1926. 112, p. 167. 164, p. 144.

Coyote

(see Rightside)

Crescent

(see Orient, Crescent, and Deadwood)

Daisy

(see Daisy-Tempest under silver)

Daisy-Tempest (131)

(see under silver)

Dead Medicine

(see Silver Trail under lead)

Deadwood

(see Orient, Crescent, and Deadwood)

Deer Trail (207)

(see under silver)

Deer Trail Monitor (200)

(see under molybdenum)

Defender (92)

(see under zinc)

Delmonico

(see Jay Dee under silver)

Denver (194)

Loc: E½ sec. 29, (31-39E), on Deer Cr., W. of Admiral property. **Elev:** 3,100 ft. **Owner:** Denver Copper Mining Co. (1920). Abandoned (1941). **Ore:** Copper. **Ore min:** Chalcocopyrite. **Deposit:** Quartz vein parallels the lamination of schist. Some chalcocopyrite in the schist as well as in the quartz. **Dev:** 15-ft. shaft, 65-ft. crosscut adit. **Assays:** 5% to 9% Cu. **Ref:** 30, p. 46. 112, p. 176. 164, p. 184.

Detroit

(see Wabash-Detroit)

Diamond C (161)

Loc: SW¼ sec. 7, (32-41E), 2 mi. E. of Chewelah. **Elev:** 2,540 ft. **Prop:** 1 patented claim. **Owner:** Lee Potter, Yelm, Wash. (1941). **Ore:** Copper. **Ore min:** Chalcocopyrite, pyrite. **Gangue:** Quartz. **Deposit:** Ore-bearing quartz stringers in an 8-ft. granitic dike cutting argillite. **Dev:** 39-ft. inclined shaft. **Ref:** 30, pp. 39-40. 164, pp. 157-158.

Dille

(see Pelkey and Dille)

Dora

(see Acme under lead)

Double Eagle (192)

(see under lead)

Double Standard (42)

Loc: Near center N. line sec. 3, (40-39E). Within 700 ft. of international boundary, Northport dist. **Elev:** 2,200 ft. **Access:** Near road. **Prop:** Several unpatented claims. **Ore:** Copper, lead, zinc, silver, gold. **Ore min:** Pyrrhotite, chalcocopyrite, galena, sphalerite. **Deposit:** Limestones and argillites cut by dikes. Mineralized quartz veins occur in the country rock and in one of the dikes. **Dev:** 810-ft. crosscut adit, short inclined shaft, and shallow winze in adit. **Ref:** 7, pp. 61-62. 30, p. 113. 58, p. 19. 164, pp. 317-318.

Douglas

(see under tungsten)

E. M. C. (126)

(see under lead)

Eagle (153)

(see under silver)

Eagle-Newport

(see Aguila under lead)

Easter Sunday (35)

(see under gold)

Easy Money

(see Magma under zinc)

Edna (King) (190)

Loc: SE¼SE¼ sec. 9 and sec. 10, (31-39E), 9 mi. W. and 1 mi. N. of Valley, Chewelah dist. **Elev:** 2,875 ft. **Access:** Road. **Prop:** 12 claims, including: Alpine, Log Cabin, Log Cabin Extension, Mother Lode, Gladiator. Most work on Gladiator. **Owner:** C. R. and J. M. Carr, Valley, Wash. (1953—). King

Gold & Copper Mining Co. (1902-1908). Valley Mining Co. of Spokane (1917-1924). Arthur L. Hooper, Spokane, Wash. (1941). **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite, pyrite, arsenopyrite, tetrahedrite, bornite, malachite, azurite, chalcocite, melaconite. **Gangue:** Quartz, siderite. **Deposit:** Old reports described an 80-ft. mineralized zone at contact of diorite and argillite with 4 ft. of shipping ore and 6 ft. of concentrating ore. Openings now accessible show an 8-in. quartz vein along foliation of argillite. 3 ledges, with shaft on middle ledge. Vein 4 ft. wide at 125-ft. depth. **Dev:** 30-ft. shaft, 450-ft. shaft with nearly 1,000 ft. of drifts, and several caved open cuts. Level 100 ft. long at 110-ft. depth in shaft, and a level 60 ft. long at 225-ft. depth. **Assays:** 150 tons av. 7% Cu, 4 oz. Ag, \$2.75 Au. 24 assays showed 3.60% to 45.36% Cu, tr. to \$14.50 Ag, tr. to \$20 Au; and the av. was about 20% Cu, \$1.00 Ag, \$3.00 Au. **Prod:** 1899, 1904-1906, 1917. Total about \$5,000. **Ref:** 30, pp. 46-47. 33, 1907, p. 721; 1908, pp. 846-847. 97, 1917, p. 507. 98, 1918-1925. 112, p. 208. 158. 164, pp. 181-182.

Eldorado

(see Magma under zinc)

Electric Point (63)

(see under lead)

Elmo (88)

Loc: Sec. 28, (39-37E), Orient dist. **Elev:** 3,280 ft. **Access:** 3 mi. from road. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Pyrite, chalcocopyrite, malachite, limonite. **Gangue:** Calcite, quartz. **Deposit:** Argillite and greenstone cut by a 15-ft. mineralized zone. **Dev:** 15-ft. shaft, several open cuts. **Ref:** 30, p. 132. 164, p. 273.

Enterprise

(see under gold)

Enterprise (Jay Dee)

(see Jay Dee under silver)

Eureka (3)

(see under gold)

Eureka and Orient

(see Eureka under gold)

Express

(see St. Paul-Express)

Fidelity (44)

(see under gold)

Finley

(see under lead)

Fish (127)

(see under silver)

Flannigan

(see Iroquois under zinc)

Frisco Standard (61)

(see under silver)

Galena Farm (105)

(see under lead)

Galena Hill (16)

(see under lead)

Georgic (84)

Loc: Sec. 27, (39-37E), on W. slope of Jumbo Mtn., Orient dist. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, lead, silver, gold. **Ore min:** Pyrite, chalcocopyrite, galena. **Deposit:** Quartz-calcite vein in argillite. **Dev:** 84-ft. shaft, numerous open cuts. **Ref:** 30, p. 134. 164, pp. 273-274

Giant Silver

(see Red Cloud)

Gillete

(see Avondale-Dome under lead)

Gladstone (64)

(see under lead)

Globe (98)

Loc: Near SE, cor. sec. 31, (39-37E). **Elev:** 2,275 to 2,700 ft. **Access:** 3½ mi. SE. of Orient by road. **Prop:** 1 patented claim. **Owner:** B. B. Hamilton, Orient, Wash. (1941). **Ore:** Copper, gold, silver, zinc. **Ore min:** Pyrite, hematite, galena, chalcocopyrite, pyrrhotite. **Gangue:** Calcite. **Deposit:** Ore occurs as stringers filling joint planes in argillite and limestone near contact with pyrite-bearing quartz latite. **Dev:** 3 adits, one with 900 ft. of workings; 50-ft. shaft. Total of 3,000 ft. **Assays:** Small values in copper and gold reported. **Ref:** 7, p. 78. 30, pp. 121-122. 116, no. 5, 1909, p. 61. 164, p. 267.

Gold Bar (103)

(see under gold)

Gold Reef (121)

(see under gold)

Golden Reef

(see Gold Reef under gold)

Golden Seal

Loc: Cedar Canyon dist. **Ore:** Copper. **Prod:** Amount not known. **Ref:** 97, 1917, p. 507; 1918, p. 511.

Graves (83)

Loc: SW¼SW¼ sec. 35, (39-37E), Orient dist. **Owner:** John and Robert Wagner, Boyds, Wash., leasing to Hugh I. Graves, Boyds, Wash. (1945.) **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcocopyrite, rhodochrosite (?). **Deposit:** Mineralized zone about 4 ft. wide along hanging wall of fault in greenstone. **Dev:** Trench. **Assays:** Low gold and silver values. **Ref:** 157.

Gray Eagle

(see Rightside)

Great Republic (43)

Loc: Near center N. line sec. 3, (40-39E), on E. side of Sheep Cr., Northport dist. **Elev:** 2,200 ft. **Access:** Near Velvet on State Highway No. 22. **Prop:** Several unpatented claims. **Owner:** Elmer Godfrey, Northport, Wash. (1941). **Ore:** Copper, silver, gold. **Ore min:** Chalcocopyrite, pyrrhotite, galena, sphalerite. **Gangue:** Quartz, calcite. **Deposit:** Two main veins, one a quartz vein containing pyrrhotite, the other a quartz-calcite vein up to 4 ft. wide along contact between kersantite dike and limy shale. **Dev:** 400-ft. crosscut, 110-ft. winze, 120-ft. inclined shaft. **Assays:** Pyrrhotite vein assayed 11.25% Cu, 12 oz. Ag, \$2.40 Au. The other vein reported to assay 2.5% to 8.5% Cu, 19 oz. Ag, tr. to \$8 Au. **Ref:** 7, pp. 60-61. 30, pp. 113-114. 164, p. 318.

Hartford

(see Krug)

Hecla (154)

Loc: E½SW¼ sec. 4, (32-41E). **Access:** 3½ mi. NE. of Chewelah by road. **Prop:** 40 acres of deeded land. **Owner:** Tony Mally, Chewelah, Wash. (1941). Hecla Copper-Silver Mining & Milling Co. (1915-1920). International Mining & Metals Co. (1922). **Ore:** Copper, gold, silver. **Ore min:** Chalcocopyrite, azurite, malachite, cuprite, chalcocite, micaceous hematite, and some sphalerite, pyrite. **Deposit:** 4-ft. quartz vein in granite. Also smaller veins. **Dev:** 40-ft. crosscut; 100-ft. shaft

and another shaft, both full of water. **Ref:** 30, p. 41. 58, p. 29. 98, 1918-1925. 158. 164, p. 160.

High Grade (Jay Dee)

(see Jay Dee under silver)

High Grade

(see Turk)

Highland Chief

(see under silver)

Homestake (73)

(see under gold)

Hoodoo (208)

(see under silver)

Hope and Twin Cabins (70)

Loc: Sec. 18, (39-38E), Northport dist. **Elev:** 3,800 ft. **Prop:** 2 claims. **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite and some chalcocopyrite. **Deposit:** Mineralized zone 7 ft. wide in acidic diorite dike rock intrusive into Jumbo volcanics. **Dev:** Two 30-ft. adits about 30 ft. apart, several open cuts and shallow shafts. **Assays:** Reported to av. \$9.20 Au, Cu, Ag. **Prod:** 100 tons said to have been shipped. **Ref:** 164, p. 253.

Hubbard (45)

(see under lead)

Hunter

(see Jackson under zinc)

Imperial Copper (157)

Loc: Sec. 6, (32-41E), in canyon on W. flank of Old Eagle Mtn., Chewelah dist. **Elev:** 2,800 ft. **Access:** ½ mi. from road. **Prop:** 6 unpatented claims, abandoned in 1941. **Ore:** Copper, silver. **Deposit:** One 4-ft. quartz vein encountered. Workings are in limestone near schist contact. **Dev:** 150-ft. shaft with 450-ft. crosscut at bottom. Also an adit near collar of the shaft. **Assays:** Tr. Cu. **Ref:** 30, p. 40. 58, p. 32. 164, pp. 147-148.

Independent Keystone (Keystone, Strobeck) (152)

(part of Chinto holdings, which see)

Loc: Near center sec. 32, (33-41E), Chewelah dist. **Access:** Road. **Prop:** 4 patented claims and a fraction. **Owner:** Chewelah Copper Co. leasing from Western Guaranty Co. and A. I. Kulzer, Chewelah, Wash. (1953—). Independent-Keystone Mining Co. (1907-1915). Eagle Mountain Mining Co. (1949). **Ore:** Copper. **Ore min:** Chalcocopyrite. **Deposit:** Quartz vein follows bedding planes in argillite and schist. **Dev:** 700-ft. adit. **Ref:** 30, p. 37. 97, 1907, p. 476. 116, no. 1, 1907, p. 17; no. 6, 1908, p. 123. 158. 164, p. 145.

Indian

(see Eureka under gold)

Inklers Point (175)

Loc: SW¼NE¼ sec. 11, (31-40E), on hill above Inklers Point, Chewelah dist. **Elev:** 2,000 ft. **Ore:** Copper. **Ore min:** Chalcocopyrite. **Gangue:** Dolomite. **Deposit:** A few scattered crystals of chalcocopyrite occur in dolomite near a fault. **Ref:** 158.

International (23)

(see under gold)

Iron Horse

(see under gold)

Iron Horse (32)

(see under iron)

Iron Mask (12)

(see under zinc)

Iroquois (58)

(see under zinc)

Jackson (54)

(see under zinc)

Jay Dee (150)

(see under silver)

Jay Gould (156)

(see under silver)

Jayhawker (37)

Loc: NE $\frac{1}{4}$ sec. 22, (40-37E). $\frac{1}{4}$ mi. NE. of Easter Sunday property, Orient dist. **Prop:** 1 patented claim. **Owner:** Macy Forsyth, Orient, Wash. (1941). **Ore:** Copper, gold, silver, lead. **Ore min:** Pyrite, chalcopryrite. **Deposit:** Massive quartz vein in argillite and quartzite contains pyrite and a little chalcopryrite. **Dev:** Inclined shaft and several other shallow shafts and open cuts. **Ref:** 30, p. 126. 58, p. 34. 164, p. 277.

Jim Dandy (146)

Loc: NE $\frac{1}{4}$ sec. 32, (33-41E), Chewelah dist. **Access:** $\frac{1}{2}$ mi. from road. **Prop:** 4 claims, including the Sunset and Express Fraction. **Owner:** United Copper Co. (1941). **Ore:** Copper. **Ore min:** Chalcopryrite. **Deposit:** A small amount of chalcopryrite occurs in a series of argillites, limestone, and schist. Apparently no vein was encountered. **Dev:** 325-ft. crosscut adit from which a 158-ft. drift and a 300-ft. crosscut have been driven. Also a 200-ft. adit. **Ref:** 30, p. 40. 164, p. 145.

John Day (149)

(see under silver)

John Hays (130)

(see under silver)

Juno-Echo (Western Molybdenum) (160)

Loc: Center N $\frac{1}{2}$ sec. 7, (32-41E). **Elev:** 2,100 ft. **Access:** About 2 mi. from railroad at Chewelah. **Prop:** 6 patented claims: Echo, Ibex, Juno, N. I. T., Jungle, Single Standard; and 2 unpatented claims. **Owner:** Western Molybdenum Corp., Spokane, Wash. (1938-1943). June Echo Mining & Milling Co. (1915-1920). June Copper Co. (1918). Juno-Echo Copper Co. (1918-1926). **Ore:** Copper, molybdenum, tungsten, silver, gold. **Ore min:** Chalcopryrite, pyrite, molybdenite, scheelite, arsenopyrite. **Deposit:** Lenticular quartz veins from a fraction of an in. to 4 ft. wide along contact of limestone and monzonite. **Dev:** Working shaft 292 ft. deep, 850 ft. of drifts and raises, 3 inaccessible shafts of unknown depth, 2 adits 165 ft. and 50 ft. long, and numerous open cuts. **Assays:** 0.09% to 3.12% Cu, 0.32% to 1.48% MoS₂, 0.20% WO₃, 0.75 oz. Ag, tr. Au. 47 tons ore shipped av. 2.4% Cu, 0.004 oz. Au, 0.19 oz. Ag. Samples across minable widths of the vein av. 0.95% Cu, 0.12% WO₃, 0.44% Mo. **Prod:** 47 tons of ore 1917. In 1941, 300 to 400 tons were mined and milled for MoS₂, but conc. did not meet market specifications. **Ref:** 30, p. 30. 37, p. 71. 97, 1916, p. 614. 98, 1918-1926. 112, p. 185. 113, 2/4/37, p. 7. 117, no. 1, 1922, p. 41. 130, p. 82. 133-B, pp. 73-86. 157. 158. 164, pp. 153-154.

Katy

(see Blue Grass under gold)

Kemp-Komar

(see Loon Lake Copper)

Keough (62)

(see under lead)

Kettle River (Galena Hill)

(see Galena Hill under lead)

Kettle River (White Elephant)

(see White Elephant under gold)

Key West

(see Loon Lake Copper)

Keystone

(see Independent Keystone)

King

(see Edna)

Koyotte

(see Rightside)

Krug (Hartford) (186)

Loc: NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 26, (33-39E). **Elev:** 2,300 to 2,500 ft. **Access:** 1 $\frac{1}{2}$ mi. NW. of Bluecreek by road. **Prop:** 10 claims: Saturn, Jupiter, Morning Star, Hartford, Diana, Midnight, Bismark, Venus, Aurora, Henrietta Fraction. **Owner:** Mrs. A. Krug, Bluecreek, Wash. (1941). Krug Gold & Copper Mining Co. (1907-1920). **Ore:** Copper, silver, gold. **Ore min:** Pyrite, chalcopryrite, tetrahedrite, galena, sphalerite, malachite, azurite, limonite, cuprite. **Deposit:** Several quartz veins in limestone and diabase. One vein 2 or 3 ft. wide is fairly well mineralized. Also some pyrite and chalcopryrite disseminated in diabase and metamorphics. **Dev:** 340-ft. adit, 35-ft. shaft, open cuts. **Assays:** A specimen from the 2- or 3-ft. vein assayed 0.49 oz. Au, 94.2 oz. Ag, 4.8% Cu. **Prod:** Small amount 1916. **Ref:** 7, pp. 109-110. 30, p. 43. 97, 1907, p. 476; 1916, p. 614. 116, no. 4, 1908, p. 90; no. 6, 1908, p. 124. 164, pp. 167-169.

Lake

(see under gold)

Lakeside (7)

Loc: Sec. 20, (40-37E), on W. side of Box Canyon, Orient dist. **Elev:** 2,830 ft. **Access:** Road above the property. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Chalcopryrite, pyrite, malachite. **Gangue:** Quartz. **Deposit:** Shear zone in Rossland volcanics is mineralized to a width of 1 ft. **Dev:** 125-ft. adit, 30-ft. drift, several open cuts. **Ref:** 30, p. 129. 164, p. 284.

Lem (33)

(see under gold)

Liberty Copper (183)

Loc: N $\frac{1}{2}$ NE $\frac{1}{4}$ sec. 2, (32-39E), Chewelah dist. **Elev:** 2,500 ft. **Access:** 2 $\frac{1}{2}$ mi. SW. of Bluecreek by road. **Prop:** 6 unpatented claims. **Owner:** Liberty Copper Co. (1941). Liberty Copper Mining Co. (1907-1924). Copper Production Co. (1924-1926). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, tetrahedrite, bornite, chalcocite, cuprite, malachite, azurite. **Gangue:** Quartz, siderite. **Deposit:** Mostly small, barren to slightly mineralized quartz veins in metamorphics. One vein 6 ft. wide, another 4 ft. wide. **Dev:** More than 2,000 ft. of workings on lower level and a 300-ft. adit on upper level. **Assays:** In 1909 an av. of 28 assays was \$19.20 Au, Ag, Cu. **Prod:** Has produced. **Ref:** 7, p. 110. 30, p. 42. 98, 1918-1926. 112, p. 614. 114, no. 5, 1909, p. 58. 116, no. 6, 1907, p. 28; no. 7, 1907, p. 13; no. 12, 1907, p. 15; no. 4, 1908, p. 90. 164, pp. 163-165.

Little Frank (206)

(see under lead)

Little Gem

(see under silver)

Little Giant (14)

(see under lead)

Longshot (118)

(see under lead)

Lookout

Loc: Chewelah dist. **Owner:** Copper Hoard Mining Co. (1918-1924). **Ore:** Copper. **Ref:** 98, 1918-1925.

Loon Lake Blue Bird (172)

Loc: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, (31-41E), $\frac{1}{4}$ mi. E. of Loon Lake Copper workings on Grouse Cr. **Elev:** 2,550 ft. **Access:** 5 $\frac{1}{2}$ mi. N. of the town of Loon Lake. **Prop:** 4 claims: Bluebird, Wonder, Dupont, Juno. **Owner:** John P. Orchgar, Loon Lake, Wash. (1941). Loon Lake Blue Bird Copper Co. (1918-1924). **Ore:** Copper. **Ore min:** Chalcopyrite, bornite, chalcocite, cuprite, malachite, azurite, pyrite. **Deposit:** 5- to 10-ft. quartz vein in argillite and quartzite. Vein sparsely mineralized. **Dev:** Shafts 40 and 82 ft. deep, adit 215 ft. long. Workings now caved. **Assays:** Vein in adit said to assay 3.87% Cu. **Prod:** Has produced. **Ref:** 58, p. 40. 98, 1920-1926. 106, no. 12, 1919, p. 5. 112, p. 189. 129, pp. 158-159. 164, p. 217.

Loon Lake Copper (Kemp-Komar, Key West, Bluebird) (173)

Loc: Near center sec. 33, (31-41E). **Elev:** 2,625 ft. **Access:** 6 mi. N. of the town of Loon Lake. **Prop:** 2 claims. **Owner:** Ernest Laukka and E. L. Tilton, Chewelah, Wash. (1954—). Kemp-Komar Copper Mining Co. (1902-1922). Loon Lake Copper Co. (1918-1929). James Keeth and W. H. West, Spokane, Wash. (1945). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, bornite, tetrahedrite, malachite, azurite, cuprite, atacamite, hematite, pyrite. **Deposit:** Quartz vein from 4 to 20 ft. wide in argillite. Known payshoot was 200 ft. long and 500 ft. deep. **Dev:** 480-ft. shaft from which about 700 ft. of drifts have been driven on 3 levels, 60-ft. shaft, and some drifts. Workings now inaccessible. **Assays:** Mill feed av. 2% Cu, a few oz. Ag, and a little Au. Highest Au value was \$2.00. **Prod:** About \$125,000 by 1918. **Ref:** 30, p. 30. 33, 1907, p. 714. 52, p. 10. 88, p. 8. 97, 1916-1919, 1929. 98, 1918-1925. 106, no. 20, 1918, p. 4; no. 14, 1919, p. 5; no. 22, 1920, p. 4. 112, pp. 153-155. 117, no. 2, 1916, pp. 10-11; no. 7, 1916, p. 4; no. 15, 1916, pp. 6-7; no. 9, 1917, pp. 4-5. 129, pp. 153-158. 130, p. 63. 164, pp. 217-219.

Lottie (79)

Loc: Sec. 19, (39-38E), Orient dist. **Elev:** 3,900 ft. **Prop:** 1 claim. **Ore:** Copper, gold, silver. **Ore min:** Pyrite, pyrrhotite, chalcopyrite. **Deposit:** 8-ft. mineralized zone in rhyolite porphyry intrusive into quartzite and andesite. **Dev:** 50-ft. shaft and trenches and open cuts for 500 ft. along course of the vein. **Assays:** 50 tons mined said to av. \$18 Au, Cu, Ag. **Prod:** About \$900 prior to 1914. **Ref:** 164, pp. 252-253.

Lucky Boy (109)

(see under lead)

Lucky Boy (Turk)

(see Turk)

Lucky Charlie (8)

Loc: NE $\frac{1}{4}$ sec. 26, (40-36E), Orient dist. **Elev:** 2,240 ft. **Access:** Road. **Prop:** 1 claim, now part of the Hudspeth farm land. **Ore:** Copper, lead, zinc, silver. **Ore min:** Galena, sphalerite, chalcopyrite. **Deposit:** 2- to 6-in. vein of quartz in quartzite and schist contains small quantities of ore minerals. **Dev:** 300-ft. adit, 40-ft. shaft connecting with the adit, and a 30-ft. winze. **Ref:** 30, p. 119. 164, pp. 291-292.

Lucky Four (65)

(see under silver)

M. and C.

(see U. S. Copper Gold under silver)

McKinley (4)

(see under gold)

McNally (29)

(see also Pelkey and Dille, Regina)

Loc: Secs. 33 and 34, (40-37E), Orient dist. **Elev:** 2,600 to 2,800 ft. **Access:** Approx. 6 mi. E. of Rockcut by road. **Prop:** Several claims, including the Pelkey and Dille property. **Owner:** Bunker Hill & Sullivan Mining & Concentrating Co., San Francisco, Calif. (1937-1951). **Ore:** Copper, gold, silver, lead. **Ore min:** Pyrite, chalcopyrite, hematite. **Gangue:** Quartz, epidote, serpentine. **Deposit:** Replacement of limestone, also an 8-ft. quartz vein. **Dev:** 330-ft adit, 250-ft. adit, several short adits, 75-ft. shaft, and several open cuts total about 1,000 ft. **Prod:** 1938. **Ref:** 7, pp. 84-85. 30, pp. 124-125. 97, 1939, p. 491. 104, 4/15/37, p. 35. 113, 4/1/37, p. 7. 164, pp. 276-277.

McNess (36)

(see under gold)

Mackinaw

Loc: 2 mi. E. of Pierre Lk., Orient dist. **Owner:** Colville Gold Mining Co. (1897). **Ore:** Copper. **Ore min:** Chalcopyrite. **Ref:** 63, p. 107.

Magma (113)

(see under zinc)

Majorca (80)

Loc: Sec. 19, (39-38E), 200 ft. W. of the Minorca claim, Orient dist. **Prop:** 1 claim. **Ore:** Copper. **Ore min:** Pyrite, malachite. **Deposit:** Limestone cut by basic igneous dikes. Mineralized zone contains a little pyrite and copper stains. **Dev:** 40-ft. inclined shaft. **Ref:** 164, p. 254.

Maple Leaf

(see Melrose under silver)

Maryland

(see Bonanza Copper)

Mayflower (170)

(see under lead)

Melrose (51)

(see under silver)

Mexico

(see Queen under silver)

Middleport (117)

(see under zinc)

Mineral Hill

(see Aichan Bee under silver)

Minnehaha (151)

Loc: Sec. 36, (33-40E), on E. Fk. Chewelah Cr., Chewelah dist. **Owner:** D. F. Strobeck, Spokane, Wash. (1902). **Ore:** Copper, gold, silver. **Deposit:** Mineralized zone 8 to 30 ft. wide. **Dev:** 40-ft. adit. **Assays:** Av. assay value is 6% Cu, \$7.50 Au, 6.5 oz. Ag. **Ref:** 88, p. 7.

Minorca (81)

Loc: Sec. 19, (39-38E), on W. branch of Fifteen Mile Cr., Orient dist. **Elev:** 3,200 ft. **Owner:** Centennial Mines Co. (1924). Minorca-Homestake Mines Co. (1922). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, pyrrhotite, chalcopyrite. **Gangue:** Quartz. **Deposit:** Vein in limestone and argillite, which are cut by altered basic dikes. **Dev:** 2 shafts, one of which is 165 ft. deep. **Prod:** 100 tons prior to 1920. **Ref:** 98, 1922, p. 1656; 1925, p. 1808. 100, 1903, p. 55. 164, p. 250.

Mint

Loc: On Gold Hill near present town of Kettle Falls. **Prop:** Group of claims. **Owner:** D. F. Strobeck, Spokane, Wash. (1902). **Ore:** Copper, gold, silver. **Deposit:** 3 veins varying in width

from 8 to 25 ft. **Dev:** Adit and shaft aggregating 200 ft. **Assays:** 8% Cu, 5 oz. Ag, \$8 Au. **Ref:** 88, p. 6.

Mogul (13)

Loc: Sec. 25, (40-36E), Orient dist. **Elev:** 3,600 ft. **Access:** Near road. **Prop:** 8 unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Chalcopyrite, bornite. **Deposit:** Schist and quartzite cut by a diorite dike. Near contact of the dike with the other rocks are mineralized quartz veins. **Dev:** Several adits and shafts total about 200 ft. **Ref:** 30, p. 129. 164, p. 287.

Molly Gibson (40)

(see under gold)

Monahan (201)

Loc: Sec. 28, (30-38E). Cedar Canyon dist. **Access:** Road. **Prop:** 1 claim and 30 acres of deeded land. **Owner:** C. F. Allen, Springdale, Wash. (1941). **Ore:** Said to be copper, silver, gold. **Deposit:** Said to be a quartz vein about 12 ft. wide. **Dev:** About 1,400 ft. of workings, mostly adits. **Assays:** Said to assay \$8 Cu, Ag, Au. **Ref:** 30, p. 76.

Monitor (27)

(see under gold)

Montana (76)

(see under gold)

Montana and Washington (15)

Loc: Sec. 30, (40-37E), Orient dist. **Elev:** 2,500 to 2,750 ft. **Access:** 4 mi. from Rockcut by road. **Prop:** 4 claims: Bisbee, Green Frog, Minneapolis, St. Paul. **Owner:** Mr. Maynard and sons, Orient, Wash. (1941). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, bornite, galena, pyrite. **Deposit:** 5 quartz veins in gneissoid granite. Veins from 6 in. to 25 ft. wide. **Dev:** 215-ft. adit and numerous open cuts, short adits, and shafts totaling more than 300 ft. **Assays:** Ore from St. Paul assayed from \$5.90 to \$95.60 per ton. Ore from Green Frog assayed \$5.20 Au. Cu chief value on Minneapolis, but 16 to 20 oz. Ag sometimes present. **Ref:** 30, p. 127. 106, 7/21/32, p. 1. 158. 164, pp. 279-280.

Montezuma (181)

Loc: SW $\frac{1}{4}$ sec. 13, (32-39E). **Access:** 7 mi. due W. of Chewelah by road. **Prop:** 40 acres of deeded land. **Owner:** John Rietzkers, Bluecreek, Wash. (1941). **Ore:** Copper reported. **Deposit:** Barren 4-in. quartz vein in quartzite and argillite. No ore exposed. **Dev:** 150-ft. adit from which a 110-ft. drift has been driven. **Ref:** 30, p. 43. 164, p. 169.

Montgomery (168)

Loc: Secs. 17 and 20, (32-41E), Chewelah dist. **Elev:** 2,840 ft. **Prop:** 160 acres of leased State land. **Owner:** Leased by Elmer Mullen, Chewelah, Wash. (1948). **Ore:** Copper, lead, silver, gold. **Ore min:** Chalcopyrite, galena, hematite. **Gangue:** Quartz, siderite. **Deposit:** 3-ft. vein in quartzite and schist carries ore minerals. 2 other veins or continuations of the 3-ft. vein have been exposed, one of which carries some galena and chalcopyrite. **Dev:** 400-ft. adit, 150-ft. adit, 140-ft. shaft, 2 shorter adits, and a 15-ft. shaft. **Ref:** 30, p. 35. 52, p. 12. 164, p. 158.

Montgomery (Platsburg)

(see Platsburg)

Moonlite

(see Morning under silver)

Moore (48)

(see under gold)

Moraski (52)

Loc: Sec. 1, (40-40E), 1 mi. W. of Columbia R., Northport dist. **Access:** Near road. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** A little chalcopyrite and pyrite. **Gangue:** Quartz. **Deposit:** Argillite, quartzite, schist, and limestone cut by basic and acidic dikes. A much-altered aplite dike is slightly mineralized. **Dev:** 15-ft. adit, several small open cuts. **Ref:** 30, p. 96. 164, p. 317.

Morning (114)

(see under silver)

Morning Star

(see under gold)

Mountain View (47)

(see under silver)

Mullen (165)

(see under lead)

Myerah (60)

(see under lead)

Mystery (28)

Loc: SE $\frac{1}{4}$ sec. 29, (40-37E), in lower part of Box Canyon, Orient dist. **Elev:** 2,680 ft. **Access:** About 4 mi. E. of Rockcut by road. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopyrite. **Deposit:** Altered latite flows cut by granite dikes. An 8-ft. quartz vein in these rocks is somewhat mineralized. Fracture zones also mineralized to some extent. **Dev:** 300-ft. adit, 40-ft. adit, 25-ft. shaft, several other adits, shallow shafts, and open cuts. **Ref:** 30, p. 128. 164, p. 283.

Nabob (155)

Loc: Sec. 9, (32-41E), Chewelah dist. **Access:** Road passes near the property. **Prop:** 1 claim. **Owner:** O. C. Niles, Chewelah, Wash. (1941). **Ore:** Copper, gold. **Ore min:** Pyrite, pyrrhotite, small amount of chalcopyrite. **Deposit:** A 1-ft. quartz vein in quartzite. **Dev:** Shallow inclined shaft. **Assays:** Said to carry small values in gold. **Ref:** 30, p. 40. 164, p. 159.

Napoleon (100)

(see under iron)

Nellie S.

(see Chewelah Standard)

Nest Egg (90)

(see under gold)

Nevada (180)

(see under lead)

Newport (Eagle-Newport)

(see Aguilla under lead)

Noble Four

Loc: Bossburg dist. **Ore:** Copper, silver, lead, gold. **Ref:** 105, 1911, p. 511.

Old Abe

Loc: Summit dist., near Columbia R. **Owner:** J. N. Squire (1892). **Ore:** Copper, silver. **Deposit:** 4-ft. quartz vein. **Dev:** 40-ft. shaft. **Assays:** 5% Cu, 20 oz. Ag. **Ref:** 12, p. 79. 13, p. 124.

O-Lo-Lim (214)

Loc: NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 9, (28-37E), 3 mi. N. of Spokane R., Cedar Canyon dist. **Access:** 1 $\frac{1}{2}$ mi. NE. of Detillion Bridge. **Prop:** 2 claims on 40-acre Indian Agency lease. **Owner:** West King Mining Co. (1941). O-Lo-Lim Copper Mining Co. (1918-1926). **Ore:** Copper, silver, zinc, gold. **Ore min:** Chalcopyrite, pyrite, bornite, malachite, tenorite. **Gangue:** Quartz, tremolite. **Deposit:** 2- to 6-ft. quartz vein near plane of contact between

argillite and quartzite. Intrusive granite within $\frac{1}{4}$ mi. **Dev:** 100-ft. shaft with 35- and 15-ft. drifts at bottom, vertical shaft 220 ft. deep. **Assays:** 10 cars of ore shipped av. 7% to 10% Cu, 1 to 2 oz. Ag. **Prod:** About \$18,000 to end of 1920. **Ref:** 30, pp. 69-70. 46, pp. 110-111. 97, 1917-1919. 98, 1920-1926. 112, p. 196. 129, pp. 160-162. 164, p. 223.

O'Neal-Schenk

(see Rightside)

Ora

Loc: On or near Jumbo Mtn. W. of Fifteen Mile Cr., Northport dist. **Elev:** 3,400 ft. **Prop:** 1 claim. **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite, chalcopryrite. **Deposit:** 7-ft. vein in altered diorite dike rock intrusive into Jumbo volcanics. **Dev:** Shallow shafts, open cuts, and a large amount of surface stripping along the vein. **Assays:** Said to assay \$11 in Au, Cu, Ag. **Prod:** 50 tons of ore shipped prior to 1914. **Ref:** 164, pp. 253-254.

Orchid (195)

(see under silver)

Orient, Crescent, and Deadwood (96)

Loc: Sec. 31, (39-37E) and sec. 36, (39-36E), on W. slope of Toulou Mtn., Orient dist. **Elev:** 1,800 to 2,050 ft. **Access:** $2\frac{1}{2}$ mi. by road from railroad at Orient. **Prop:** 3 patented claims: Orient, Deadwood, Crescent. **Owner:** Stevens County (1941). **Ore:** Copper, gold. **Ore min:** Chalcopryrite, pyrite. **Deposit:** Mineralized fracture zones 4 ft. wide in calcareous argillite. **Dev:** 250 ft. of shafts, open cuts, long adit (caved 1941). **Assays:** \$9.00 per ton (1920). **Ref:** 7, pp. 79-80. 30, p. 132. 164, pp. 268-269.

Orient Eureka

(see Eureka under gold)

Orpha (82)

Loc: Sec. 19, (39-38E), 5 mi. NW. of Williams on the Columbia R., Northport dist. **Elev:** 3,750 to 3,950 ft. **Prop:** 3 claims: Orpha Nos. 1, 2, and 3. **Ore:** Copper, gold. **Ore min:** Pyrite, pyrrhotite, chalcopryrite. **Deposit:** Several veins exposed. One is 12 ft. wide. Country rock is basic andesite cut by rhyolite porphyry dikes. **Dev:** 3 shafts, 150, 20, and 15 ft. deep; 55-ft. adit; and large open cut. **Assays:** Reported to carry Au. **Ref:** 164, p. 252.

Pacific Copper (182)

Loc: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, (32-39E), Chewelah dist. **Elev:** 2,700 to 2,900 ft. **Access:** 4 mi. by road S. of Bluecreek. **Prop:** 160 acres of deeded land. **Owner:** Northwest Magnesite Co. (1941). **Ore:** Copper, gold. **Ore min:** Chalcopryrite. **Gangue:** Quartz, calcite. **Deposit:** Small quartz seams in greenstone and quartzite contain some chalcopryrite. One seam 3 in. wide, another 10 to 14 in. wide. **Dev:** 460-ft. adit, 125-ft. shaft, 40-ft. shaft, open cut. **Ref:** 30, p. 42. 164, pp. 166-167.

Paragon

(see Melrose under silver)

Paymaster

Loc: Orient dist. **Owner:** Paymaster Mining Corp. (1909). **Ore:** Copper, gold. **Ref:** 114, no. 5, 1909, p. 62.

Payne (162)

Loc: Sec. 8, (32-41E), Chewelah dist. **Access:** Road. **Prop:** 1 claim. **Owner:** J. H. Savage, Chewelah, Wash. (1941). **Ore:** Copper, silver, gold, zinc. **Deposit:** Quartz vein in granite. **Dev:** Vertical shaft, 75-ft. inclined shaft, and 50-ft. adit. **Ref:** 30, p. 33.

Pedro (77)

(see under gold)

Pelkey and Dille (30)

(see also McNally)

Loc: Secs. 28, 33, and 34, (40-37E), on N. side of Pierre Cr. E. of Box Canyon. **Access:** 6 mi. E. of Rockcut by road. **Prop:** 2 claims, now part of McNally group. **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopryrite. **Deposit:** Limestone, quartzite, and argillite cut by igneous dikes. Ore occurs in fracture zones in these rocks. **Ref:** 30, p. 127. 164, p. 280.

Perry (138)

Loc: NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, (33-41E), on hill of 2,890-ft. elevation. **Elev:** 2,800 ft. **Prop:** 2 unpatented claims. **Owner:** Harold F. Newell, Colville, Wash. (1955—). **Ore:** Copper. **Ore min:** Chalcopryrite, pyrite, malachite. **Gangue:** Argillite. **Deposit:** Thin-bedded argillites with sparsely disseminated ore minerals along the bedding planes. A 22-in. vein of nearly solid chalcopryrite reported in the shaft. **Dev:** Shaft 90 ft. deep and numerous shallow shafts and open cuts. **Ref:** 158.

Platsburg (Montgomery) (184)

Loc: Sec. 35, (33-39E) and sec. 2, (32-39E), Chewelah dist. **Access:** Road. **Prop:** 4 claims. **Owner:** James Platt, Chewelah, Wash. (1941). **Ore:** Copper, gold. **Deposit:** Said to be a quartz "dike" 50 ft. wide, which is sparsely mineralized with copper and gold. **Dev:** 100-ft. shaft and 600 ft. of crosscut tunnels. **Ref:** 30, p. 33.

Pomeroy (34)

(see under zinc)

Pop (Silent Bell) (85)

Loc: Sec. 27, (39-37E), Orient dist. **Elev:** 4,000 ft. **Access:** 3 mi. from road. **Prop:** 2 patented claims: Lucky Page, Populist. **Owner:** H. C. Topping and V. E. Blair, Orient, Wash. (1941). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, pyrrhotite, limonite. **Gangue:** Quartz. **Deposit:** Argillite, limestone, and schist cut by monzonite dikes. Ore minerals occur in honeycombed quartz in the limestone. One ore zone 2 ft. wide, another 10 ft. wide. **Dev:** Shaft, short adit, and open cut on Lucky Page claim. 140-ft. adit, 50-ft. adit, and 80-ft. shaft on Populist claim. **Assays:** Ore on Lucky Page claim reported to assay as high as \$41 Au, Cu, Ag. **Ref:** 30, p. 131. 164, p. 272.

Providence (46)

(see under lead)

Providence

(see Deer Trail under silver)

Quadra

(see under gold)

Quartzite Mountain (169)

Loc: W $\frac{1}{2}$ NE $\frac{1}{4}$ sec. 17, (32-41E), about 50 ft. above the W. shore of a small lake. **Elev:** 2,500 ft. **Access:** Road within $\frac{1}{2}$ mi. of the property. **Ore:** Copper. **Ore min:** Chalcopryrite, bornite, cuprite, malachite. **Gangue:** Calcite. **Deposit:** Calcareous argillite contains a few scattered ore minerals. **Dev:** Adit about 400 ft. long. **Ref:** 158.

Queen (210)

(see under silver)

Queen and Seal

(see Queen under silver)

Rambler (197)

Loc: NE $\frac{1}{4}$ sec. 15, (30-38E), on E. slope of Huckleberry Mtn., Deer Trail dist. **Elev:** 3,200 ft. **Access:** Near road. **Prop:** 3 claims: Morning Star, Evening Star, Rambler No. 2. **Owner:** John Wolf and associates (1920). Believed to be abandoned (1941). **Ore:** Copper. **Ore min:** Chalcopryrite. **Deposit:** Several quartz veins, one 4 ft. wide. Some ore minerals in limestone

also. Zone in which workings are located is near the surface and badly broken. No sizable or continuous ore body exposed. **Dev:** 265-ft. adit, several other short adits. **Prod:** 1916, 1917. **Ref:** 30, p. 63. 97, 1916, p. 616; 1917, p. 507. 164, pp. 210-211.

Read (199)

(see under iron)

Reardon Copper

(see Turk)

Red Cloud (Giant Silver) (204)

Loc: Sec. 6, (29-38E), 2 mi. SE. of Turk, Cedar Canyon dist. **Elev:** 3,400 ft. **Access:** ½ mi. off the Deer Trail road. **Prop:** Group of claims. **Owner:** Mrs. Holland, Davenport, Wash. (1941). Giant Silver Mining Co. (1921-1926). **Ore:** Copper, silver, lead, gold. **Ore min:** Chalcopryrite, pyrite, silver sulfide (?), limonite, malachite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Irregular fractures in quartzite, near intrusive granite, are filled with a quartz, calcite, and siderite gangue carrying considerable chalcopryrite and pyrite. Low-grade deposit. **Dev:** Caved shaft, 100-ft. crosscut, 200-ft. crosscut, and 160-ft. crosscut. **Prod:** Unknown amount of silver ore. **Ref:** 30, p. 75. 97, 1928, p. 703. 98, 1922-1926. 129, pp. 150-151.

Red Lion (21)

Loc: Sec. 1, (39-36E), on E. side of road from Orient to Rockcut. **Access:** Near road. **Prop:** 160 acres of deeded land and several unpatented claims. **Owner:** Clarence Houtchin, Orient, Wash. (1941). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite. **Gangue:** Quartz. **Deposit:** Diorite in which are zones of fracturing and crushing. Zones are decomposed and slightly mineralized. **Dev:** 6 adits, one 275 ft. long. **Ref:** 30, p. 131. 164, pp. 292-293.

Red Sheaf (104)

(see under gold)

Red Top (57)

(see under lead)

Redemption

Loc: Valley area. **Ore:** Copper. **Prod:** 1918. **Ref:** 97, 1918, p. 511.

Redwood

(see Eagle under silver)

Regina (31)

(see also McNally)

Loc: Secs. 33 and 34, (40-37E), on S. side of Pierre Cr., Orient dist. **Elev:** 2,820 ft. **Access:** Near road, 6 mi. from railroad at Rockcut. **Prop:** 1 unpatented claim, now part of McNally group (1941). **Owner:** Fitzgerald estate (1941). Hester Mining Co. (1909). **Ore:** Copper, gold, silver. **Ore min:** Chalcopryrite, pyrite. **Gangue:** Quartz. **Deposit:** Limestone, quartzite, and latite cut by granite dikes. Mineralization occurs in the country rock at its contact with granite. One mineralized zone is 2½ ft. wide. **Dev:** 300 ft. of work in shafts and adits. **Assays:** Ore said to yield \$20 Cu, Au. **Ref:** 30, p. 126. 114, no. 5, 1909, p. 60. 164, pp. 275-276.

Revenue

Loc: Stevens County. **Owner:** Revenue Mining Co. (1907). **Ore:** Copper, gold. **Ref:** 33, 1907, p. 965.

Rightside (Coyote, Gray Eagle, Koyotte, O'Neal-Schenk) (123)

Loc: Center sec. 17, (or NE¼ sec. 18) (?), (36-38E), on E. side of Roosevelt Lk., Kettle Falls dist. **Access:** About 1 mi. N. of Kettle Falls by road. **Prop:** 2 claims: Rightside, Rightside No. 2. **Owner:** E. B. Gibbs, Colville, Wash., leasing from Cham-

berlain and Miller (1953—). James O'Neal and George Schenk, Kettle Falls, Wash. (1942). **Ore:** Copper, silver, gold, lead, molybdenum. **Ore min:** Bornite, chalcopryrite, pyrite, a little molybdenite, cuprite, malachite, azurite, galena. **Gangue:** Quartz, calcite, gypsum. **Deposit:** An 8-ft. mineralized fracture zone in a series consisting of argillite and quartzite cut by granite dikes. One vein is 4 ft. wide. **Dev:** Adit connected to surface by an 80-ft. raise, 20-ft. shaft. Workings total about 1,400 ft. **Assays:** One assay showed \$18.50 Cu, \$2.50 Ag. Zone is reported to av. 12% Cu, 22 oz. Ag. **Prod:** Small amount of copper ore in 1918. About 50 tons of copper conc. per week in 1954. **Ref:** 30, pp. 55-56. 97, 1914, p. 653. 158. 164, p. 231.

Rinchaw

(see Middleport under zinc)

Robena

(see Young America under zinc)

Rocky Creek

(see Burrus under zinc)

Rocky Lake (133)

(see under molybdenum)

Royal (140)

Loc: W½ sec. 28, (33-41E), on W. slope near summit of Eagle Mtn., Chewelah dist. **Access:** 1 mi. from road. **Prop:** 6 unpatented claims. **Owner:** United Copper Co. (1941). **Ore:** Copper. **Deposit:** Quartz and siderite, containing values in copper, have been found as float. An adit driven in banded quartzite failed to encounter source of the float. **Dev:** 460-ft. crosscut adit. **Ref:** 30, p. 41. 164, p. 160.

Royal Gold

(see Hubbard under lead)

St. Crispin (49)

(see under gold)

St. Paul-Express

Loc: On Gold Hill near the Mint group, Meyers Falls dist. **Prop:** 2 claims. **Owner:** D. F. Strobeck, Spokane, Wash. (1902). **Ore:** Copper, gold, silver. **Deposit:** 2 veins from 12 to 35 ft. wide. **Dev:** Adit and shaft. **Assays:** 9% Cu, \$7.50 Au, 5 oz. Ag. **Ref:** 88, p. 6.

Salina (18)

Loc: Near SW. cor. sec. 36, (40-36E), Orient dist. **Access:** About 1,000 ft. NE. of Rockcut. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper. **Ore min:** Chalcopryrite. **Deposit:** Chalcopryrite stringers in a zone of crushed country rock 18 in. wide. Country rock consists of gneiss cut by dikes and masses of basic diorite. **Dev:** 2 adits, one 78 ft. long. **Ref:** 30, p. 130. 164, p. 290.

Saratoga

(see under gold)

Saturday Night-Sunday Morning (211)

(see under lead)

Schenk

(see Rightside)

Schoneberg

(see Schrenberg under antimony)

Schrenberg (163)

(see under antimony)

Scotia (99)

Loc: Near NW. cor. sec. 5, (38-37E), Orient dist. **Elev:** 2,600 to 2,825 ft. **Access:** Connected to Globe prospect by ½ mi. of trail. **Prop:** 3 patented and other unpatented claims.

Owner: Stevens County (1941). **Ore:** Copper, gold, iron. **Ore min:** Pyrrhotite, pyrite, chalcopyrite. **Deposit:** Ore minerals occur as seams and pods along joint planes in schist and quartzite. No well-defined veins. Deposits are small and siliceous. **Dev:** 150-ft. adit, 200-ft. shaft, large open cut, shallow shaft. **Assays:** Ore said to av. 40% pyrrhotite. **Prod:** Some shipments are said to have been made to a smelter as flux. **Ref:** 7, pp. 78-79. 30, p. 132. 114, no. 5, 1909, p. 61. 164, pp. 266-267.

Security Copper (158)

Loc: Secs. 6 and 7, (32-41E), $\frac{1}{4}$ mi. N. of Juno Echo mine. **Elev:** 2,220 ft. **Access:** 3 mi. E. of Chewelah by road. **Prop:** 3 unpatented claims. **Owner:** Homer Shepler, Chewelah, Wash. (1941). Security Copper Co. (1915-1926). **Ore:** Copper, silver. **Ore min:** Chalcopyrite, pyrite, malachite. **Deposit:** Ore minerals occur in decomposed argillite containing stringers of quartz. There are 6 veins. In some instances ore minerals occur in the quartz and in others in argillite. **Dev:** 552-ft. shaft with 635 ft. of drifts and crosscuts. Other shallow shafts, open cuts, and trenches. **Ref:** 30, p. 39. 98, 1918-1926. 158. 164, pp. 154-156.

Shallenberger

(see Copper Butte)

Short Wait (67)

(see under lead)

Sierra Zinc (112)

(see under zinc)

Silent Bell

(see Pop)

Silver Basin

(see Queen under silver)

Silver Mountain

(see Daisy-Tempest under silver)

Silver Queen (Queen)

(see Queen under silver)

Silver Queen (Ark)

(see Ark under silver)

Silver Seal

(see Queen under silver)

Silver Summit (187)

(see under lead)

Silver Trail (107)

(see under lead)

Smoky Bullion

(see A and C)

Snyder and Baxter

(see under silver)

Sprague

(see Checops)

Squire

(see under lead)

Stemwinder (10)

Loc: W $\frac{1}{2}$ sec. 25, (40-36E), 1,000 ft. E. of Lucky Charlie property, Orient dist. **Access:** Near road. **Prop:** 1 unpatented claim. **Owner:** Abandoned (1941). **Ore:** Copper, lead, silver. **Ore min:** Galena, chalcopyrite, pyrite. **Deposit:** 2- to 4-in. vein of quartz in quartzite and schist. Very small amounts of ore minerals in the vein. **Dev:** 12-ft. shaft, open cuts. **Ref:** 30, p. 130. 164, p. 291.

Stockwell

(see Columbia Tungsten under tungsten)

Strobeck

(see Independent Keystone)

W. B. Stuart

(see John Day under silver)

Sugar Loaf

(see Vanasse under silver)

Summit (6)

Loc: Sec. 20, (40-37E), high on mountain, or possibly NE $\frac{1}{4}$ sec. 5, (39-37E), Orient dist. **Access:** Near road but difficult of access. **Prop:** 2 unpatented claims. **Owner:** Abandoned (1941). Summit Gold & Copper Mining Co. (1908-1909). **Ore:** copper, gold. **Deposit:** Quartz vein. **Dev:** 300-ft. crosscut adit. **Ref:** 30, p. 126. 33, 1908, p. 1281. 114, no. 5, 1909, p. 62.

Summit (Silver Summit)

(see Silver Summit under lead)

Sunday Morning

(see Saturday Night-Sunday Morning under lead)

Sunnyside

(see under gold)

Sunset (50)

(see under lead)

Superior Copper (178)

Loc: SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, (32-40E), in lower part of Buck Canyon, Chewelah dist. **Elev:** 2,245 ft. **Access:** Road. **Prop:** 40 acres of deeded land. **Owner:** Norman Finch, Chewelah, Wash. (1941). **Ore:** Copper, gold, silver, lead, tungsten. **Ore min:** Chalcopyrite, malachite, azurite, pyrite. **Deposit:** 5-ft. quartz vein with 1 ft. of schist in its center lies parallel to the planes of schistosity in a series consisting of quartzite, argillite, and schist. **Dev:** 790-ft. crosscut adit and several open cuts. **Prod:** Several carloads of ore. **Ref:** 30, p. 45. 105, vol. 99, 1909, p. 379; vol. 105, 1912, p. 545. 164, pp. 188-189.

Sure Thing (93)

(see under gold)

Sweet Home

(see Big Jim under gold)

Syndicate

Loc: Near Bald Eagle property, Orient dist. **Owner:** Syndicate Gold Mining Co. (1897). **Ore:** Copper, gold, silver. **Dev:** 15-ft. shaft. **Assays:** 19% Cu, \$13 Au, \$2.17 Ag (1897). **Ref:** 63, p. 107.

Tempest (132)

(see under silver)

Tenderfoot

(see Avondale-Dome under lead)

Thomason Queen (136)

Loc: Near NE. cor. sec. 1, (33-40E), or SE. cor. sec. 36, (34-40E), Chewelah dist. **Elev:** 2,500 ft. **Access:** Road. **Prop:** 6 unpatented claims. **Owner:** R. C. Thomason, Chewelah, Wash. (1941). **Ore:** Copper, silver, gold. **Ore min:** Chalcopyrite, malachite, azurite, bornite (?), pyrite. **Gangue:** Quartz. **Deposit:** Brecciated quartzite contains sparsely disseminated ore minerals. **Dev:** 185-ft. adit, a shaft, and a caved adit, also numerous open cuts. **Ref:** 30, p. 38. 158.

Togo (203)

Loc: SE $\frac{1}{4}$ sec. 31, (30-38E), on opposite side of canyon from Deer Trail group. **Elev:** 3,150 to 3,650 ft. **Access:** Road.

Prop: 9 unpatented claims. **Owner:** Alpine Uranium Corp., Salt Lake City, Utah (1954—). Consolidated Copper Co. (1915-1929). Togo Copper Co. (1929). Valentine Brasch, Fruitland, Wash., leasing to J. W. Lower and J. W. Geisbauer, Fruitland, Wash. (1951). **Ore:** Copper, silver, lead. **Ore min:** Chalcopryrite, pyrite, malachite, azurite, arsenopyrite, **Gangue:** Quartz, calcite, tremolite. **Deposit:** 2 quartz veins 4 to 18 in. wide cut calcareous argillite and dolomite. Ore disseminated in wall rocks as well as in the veins. **Dev:** 1,150-ft. adit, 200-ft. adit, shaft, open cuts. **Prod:** 1950. **Ref:** 30, p. 72. 73, p. 134. 97, 1929, p. 429. 98, 1918-1926. 106, 9/1/28; 12/5/29. 112, p. 206. 141, p. 22. 150, p. 40. 158. 164, pp. 201-203.

Tramp

Loc: On or near Jumbo Mtn., Northport dist. **Elev:** 3,100 ft. **Prop:** 1 claim. **Ore:** Copper, gold. **Ore min:** Pyrite, pyrrhotite, chalcopryrite. **Gangue:** Quartz. **Deposit:** 5-ft. vein in altered rhyolite porphyry intrusive into Jumbo volcanics. Mineralization extends into the wall rock to a minor extent. **Dev:** 20-ft. adit with a 35-ft. drift, several small open cuts. **Ref:** 164, p. 254.

Treadwell

(see Iron Mask under zinc)

Trojan (91)

(see under gold)

Turk (High Grade, Lucky Boy, Reardon Copper) (205)

Loc: N½ sec. 6, (29-38E), ¼ mi. SW. of the Togo mine, Cedar Canyon dist. **Elev:** 3,190 to 3,340 ft. **Access:** 1 mi. by road SE. of Turk. **Prop:** Deeded land. **Owner:** Alpine Uranium Corp., Salt Lake City, Utah (1954—). Turk Mining Co. (1905-1907). High Grade Mining Co. (1916-1920). Reardon Copper Co. (1920-1921). Snowdrift Mining Co. (1928-1929). Columbia River Copper Co. (1929-1937). C. F. Allen, Springdale, Wash., leasing to J. W. Lower and J. W. Geisbauer, (1950—). **Ore:** Copper, silver, gold. **Ore min:** Chalcopryrite, pyrite, tenorite, cuprite, native copper, malachite, marcasite, bornite. **Gangue:** Calcite, barite. **Deposit:** Ore occurs along shear zones in argillite and limestone, partly as fracture filling and partly as replacement of the rock. Lenses mined av. 6 ft. thick and 125 ft. wide. An 18-ft. vein reported. **Dev:** 4,000 ft. on 3 levels, including connecting stopes and raises. Strip pit (1955). **Improv:** 125-ton mill (1955). **Assays:** Typical assay said to be 9% Cu, 2 oz. Ag, 0.1 oz. Au. **Prod:** Considerable production prior to 1919. 1939-1942. 600 tons per month in 1941, 68 tons of copper conc. in 1942. 1950. 1954 (100 tons of conc.) **Ref:** 30, pp. 70-72. 33, 1907, p. 1102. 97, 1905, 1916-1919, 1928, 1929. 98, 1918-1926. 106, 9/1/28; 2/18/32. 112, p. 173. 113, 7/1/37, p. 16. 129, pp. 146-149. 130, p. 63. 141, p. 22. 150, p. 40. 158. 164, pp. 203-204.

Twilight (24)

Loc: Sec. 4, (38-37E), Orient dist. **Access:** Just off the Orient-Bossburg road. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper, gold. **Ore min:** Pyrite, chalcopryrite, azurite, malachite, limonite. **Deposit:** Argillite and limestone cut by a granite dike. A fracture zone has been slightly mineralized to a width of 6 ft. **Dev:** 475-ft. adit. **Assays:** Said to assay from \$6 to \$100 per ton. **Ref:** 30, p. 132. 164, pp. 272-273.

Twin Cabins

(see Hope and Twin Cabins)

U. S. Copper Gold (164)

(see under silver)

Udehard (2)

(see under gold)

Uncle Sam (86)

Loc: Sec. 27, (39-37E), on SW. slope of Jumbo Mtn., Orient dist. **Prop:** 2 unpatented claims, including Quartette. **Owner:** Abandoned (1941). **Ore:** Copper, lead, gold, silver. **Ore min:** Pyrite, chalcopryrite, and a little galena. **Gangue:** Quartz, siderite. **Deposit:** Breccia in a fracture zone in argillite and calcareous argillite has been slightly mineralized. **Dev:** 80-ft. shaft, 12-ft. shaft, and some open cuts. **Ref:** 30, p. 134. 164, p. 274.

United Copper (United Silver Copper) (148)

Loc: E½NW¼ sec. 32 and NE¼ sec. 31, (33-41E), on W. slope of Eagle Mtn. **Elev:** 2,400 to 3,375 ft. **Access:** 5 mi. NE. of Chewelah by good truck road. **Prop:** 7 claims, 5 fractions. **Owner:** Chewelah Copper Co., Colville, Wash. (1951—). United Copper Mining Co. (1907-1920). United Silver Copper Mining Co. (1919-1924). United Mines Corp. (1926). Chewelah Union Mining Co. (1930). United Copper Mines, Inc. (1943-1951). **Ore:** Copper, silver, gold. **Ore min:** Chalcopryrite, tetrahedrite (freibergite), pyrite, arsenopyrite, malachite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Mineralized zone in fractured argillite 5 to 20 ft. wide (av. 8 ft.). Tetrahedrite forms a persistent streak 2 to 12 in. wide. **Dev:** Adit 4,200 ft. long, 500-ft. adit, 300-ft. shaft, considerable drifting and stoping. **Improv:** 200-ton flotation mill at Palmers (1955). **Assays:** High-grade carries 75 to 300 oz. Ag. Mill feed av. 1.5% Cu, 3.5 oz. Ag, 0.01 to 0.02 oz. Au. **Prod:** 1907-1925, 1928-1931. \$2½ million up to 1934. 1943. This and Amazon claim produced 2,000 tons of ore in 1954. **Ref:** 7, pp. 98-102. 30, p. 33. 97, 1907-1925, 1928-1931. 98, 1918-1926. 105, vol. 124, 1922, pp. 126, 204. 106, no. 1, 1919, p. 3; no. 2, 1919, pp. 4-5; no. 9, 1919, p. 4; no. 4, 1920, p. 5. 112, p. 207. 114, no. 5, 1909, p. 58. 117, no. 1, 1922, p. 28. 129, pp. 123-131. 130, pp. 63, 87. 133, p. 40. 141, pp. 20, 22, 37. 158. 164, pp. 139-141.

United Silver Copper

(see United Copper)

United Treasure (59)

(see under silver)

Valley (174)

Loc: W½NW¼SW¼ sec. 18, (31-41E), on top of small isolated knob, near Valley. **Access:** A few hundred yards from road. **Ore:** Copper. **Ore min:** Malachite. **Deposit:** Quartz vein at contact of argillite and granite is copper stained in "honeycomb" phase of the vein. **Dev:** Open cut. **Ref:** 158.

Vanasse (120)

(see under silver)

Venus

(see Deer Trail under silver)

Victory

(see Vanasse under silver)

Viking (19)

Loc: Sec. 36, (40-36E) and sec. 1, (39-36E), Orient dist. **Elev:** 1,575 to 2,525 ft. **Access:** Near road. **Prop:** 3 claims: Mountain Conn, Jasperell, Maid of Erin. **Owner:** Abandoned (1941). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, few specks of galena. **Gangue:** Quartz. **Deposit:** Granitic gneiss cut by diorite dikes and overlain by latite flows. A quartz vein on the Mountain Conn claim is mineralized. Also a small mineralized zone on the Jasperell claim. **Dev:** 130-ft. adit, 80-ft. shaft, two 12-ft. shafts, several other shafts, total about 250 ft. **Ref:** 30, p. 130. 164, p. 291.

Vulcan (191)

Loc: Near center sec. 16, (31-39E), due S. of the Edna mine near headwaters of Meadow Cr., Chewelah dist. **Elev:** 3,050 to

3,400 ft. **Access:** ½ mi. from road. **Prop:** State land. **Owner:** J. Richard Brown, lessee (1914). **Ore:** Copper, silver. **Ore min:** Surface ores largely malachite, azurite, with some cuprite and chalcopryrite. **Deposit:** Vein in calcareous argillite and schist, highly oxidized and leached in upper workings. **Dev:** 630-ft. crosscut, 112-ft. adit, two 40-ft. shafts. **Assays:** Ore said to carry some Ag. **Ref:** 30, p. 46. 164, pp. 184-185.

Wabash-Detroit (189)

Loc: NW cor. sec. 10, (31-39E), Chewelah dist., ½ mi. E. of Vulcan property. **Owner:** Northwest Magnesite Co., Chewelah, Wash. **Ore:** Copper. **Ore min:** Chalcopryrite. **Deposit:** Reddish quartz vein in calcareous argillite and schist. **Dev:** 60-ft. shaft. **Ref:** 30, p. 44. 164, p. 185.

Walking Boy (69)

Loc: Sec. 17, (39-38E), NE, of the Centennial claim with David Harum claim intervening, Orient dist. **Prop:** 1 claim. **Ore:** Copper. **Ore min:** Pyrite, chalcopryrite. **Gangue:** Quartz. **Deposit:** Formation is argillite cut by aplite and kersantite dikes. Vein, which appears to be an extension of that on the Centennial claim, occurs in one of the dikes and carries a little mineral. **Dev:** Several shallow shafts and small open cuts. **Ref:** 164, pp. 254-255.

Wall Street (68)

Loc: SE¼SW¼ sec. 35, (39-39E), Northport dist. **Access:** Logging road and trail from Onion Cr. road. **Owner:** George Van Stone, Northport, Wash. (1943). **Ore:** Copper, zinc (?), reportedly nickel. **Ore min:** Pyrite, pyrrhotite, tetrahedrite (?), malachite, azurite, and either siderite or sphalerite. **Deposit:** A 2- to 4-ft. quartz vein along a shear zone in limy argillite is sparsely mineralized. Also a limy argillite near intrusive granite is heavily mineralized with iron sulfides. **Dev:** 30-ft. inclined shaft, caved shaft, and inaccessible adit. **Ref:** 158.

War Eagle (74)

(see under gold)

Washington

(see Montana and Washington)

Western Molybdenum

(see Juno-Echo)

White Elephant (5)

(see under gold)

White Horse (41)

Loc: Sec. 19, (40-39E), on S. slope of Church Hill Mtn. **Elev:** 3,650 ft. **Access:** Near road, about 19 mi. NW. of railroad at Northport. **Prop:** 3 unpatented claims. **Owner:** B. J. Hofer and associates, Northport, Wash. (1941-1948). **Ore:** Copper, gold, silver. **Ore min:** Pyrite, chalcopryrite, pyrrhotite, and some galena, sphalerite, arsenopyrite. **Deposit:** Several narrow quartz veins in schistose volcanics. **Dev:** 300 ft. of workings in 2 shafts, and a 90-ft. adit. **Assays:** Ore said to range from \$18 to \$60 per ton. Five samples gave a weighed av. of 2.4% Cu, 0.15% Pb, 0.45% Zn, 0.054 oz. Au, 1.91 oz. Ag for av. width of 1.8 ft. **Ref:** 30, p. 91. 157. 158.

Wilkie Lode (142)

(see under lead)

Williams Lake (108)

Loc: Sec. 25, (38-39E), on Onion Cr. **Access:** Road. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). **Ore:** Copper. **Deposit:** Small fissure veins carrying values in copper. **Dev:** Caved open cut. **Ref:** 30, p. 86.

Windfall (166)

Loc: Near center W½ sec. 16, (32-41E), ¼ mi. S. of the U. S. Copper Gold property, Chewelah dist. **Elev:** 2,600 to

2,775 ft. **Access:** A short distance by trail from the Schmeller School road. **Prop:** 2 claims: Evening Star, Nickel Plate; and State lease land. **Owner:** A. I. Kulzer, Chewelah, Wash. (1941). Windfall Mining Co. (1907-1920). **Ore:** Copper, gold, silver, nickel, lead. **Ore min:** Arsenopyrite, chalcopryrite, pyrite, galena. **Deposit:** Sparsely mineralized quartz vein 3 to 8 ft. wide in silicified limestone. Numerous dikes nearby. **Dev:** 90-ft. inclined shaft and a crosscut adit aggregate 1,000 ft. of workings. **Assays:** Values in gold, silver, and nickel reported. **Ref:** 7, p. 108. 30, p. 38. 114, no. 5, 1907, p. 12; no. 7, 1907, p. 13; no. 6, 1908, p. 123. 164, pp. 160-161.

Winslow (139)

(see under lead)

Young America (101)

(see under zinc)

THURSTON COUNTY

Skookumchuck (1)

Loc: Near center SW¼NW¼ sec. 16, (15-1E), on N. bank of Skookumchuck R. **Access:** Road. **Ore:** Copper. **Deposit:** Very thin sheets of native copper along joints in basalt. **Dev:** Shaft. **Ref:** 158.

WHATCOM COUNTY

Azurite (18)

(see under gold)

Beck (14)

(see Beck and Short Grub under gold)

Bismarck (17)

(see under gold)

Boundary Red Mountain (5)

(see under gold)

Chain Lakes (11)

(see under zinc)

Conway (4)

Loc: SW¼ sec. 24, (40-8E), on Damfino Cr. **Ore:** Copper. **Ore min:** Chalcopryrite, pyrite. **Deposit:** Vein in slaty argillite and greenstone. **Dev:** Long adit. **Ref:** 158.

Evergreen (9)

(see under gold)

Galena

(see Veronia under gold)

Gargett (6)

(see under gold)

Glacier

(see Midas)

Gold Hill (19)

(see under silver)

Gold Run

(see under gold)

Great Excelsior (3)

(see under gold)

Hyatt (1)

Loc: Sec. 17, (40-5E). **Ore:** Copper. **Ref:** 58, p. 31.

Lincoln

(see Great Excelsior under gold)

Midas (Glacier) (2)

Loc: Secs. 4, 5, 8 and 9, (39-7E), Mt. Baker dist. **Access:** About 50 ft. off the Mt. Baker highway at a place 1½ mi. NE.

of Glacier. **Prop:** 14 unpatented claims (1952). **Owner:** Glacier Mining Co., Seattle, Wash. (1949—). J. B. McLean et al., Hamilton, Wash. (1944). **Ore:** Copper, gold, silver. **Ore min:** Pyrite and some chalcopyrite. **Gangue:** Quartz, altered argillite. **Deposit:** Crushed zone in schist 4 to 5 ft. wide contains large chunks of nearly solid pyrite, surrounded by a crushed schist and clay. Large sulfide-bearing boulders occur as float. Company is exploring for source of boulders. (1952). **Dev:** 30-ft. adit, a long lower adit, numerous deep open cuts. **Assays:** Picked samples reportedly assay as much as 8% Cu. Av. value reported to be \$10 per ton. **Ref:** 133, p. 33. 158.

Northern Cascade

(see Gold Hill under silver)

Peterson

Loc: Mt. Baker dist. In canyon on second creek W. of Twin Lks.; this creek flows into Swamp Cr. **Access:** Trail. **Ore:** Copper. **Ore min:** Chalcopyrite. **Deposit:** Quartz vein in metasediments which are intruded by andesite. **Dev:** 40-ft. adit, winze. **Ref:** 158.

Peterson (Gold Hill)

(see Gold Hill under silver)

President

(see Great Excelsior under gold)

Red Mountain

(see Boundary Red Mountain under gold)

Saginaw (7)

(see under gold)

Shanghai (15)

(see under gold)

Short Grub

(see Beck and Short Grub under gold)

J. E. Sigh (8)

Loc: Mt. Baker dist., at Twin Lks. **Owner:** O. A. Lowery, Amos Jimmers, Shuksan, Wash. (1934). **Ore:** Copper, gold. **Dev:** 50 ft. of adits. **Ref:** 158.

Silver Creek (13)

(see under molybdenum)

Silver Tip (10)

Loc: Sec. 35, (40-9E), on Ruth Cr., Mt. Baker dist. **Access:** 4 mi. up Ruth Cr. from Shuksan by road. **Prop:** 11 unpatented claims. **Owner:** Silver Tip Mining Co., Ray Block, Bellingham, Wash. (1949-1952). **Ore:** Copper, gold, silver. **Ore min:** Pyrrhotite, pyrite, small amounts of chalcopyrite and malachite. **Gangue:** Quartz, calcite. **Deposit:** Ore minerals occur as disseminations in siliceous limestone and along shear zones. Zones of shearing are strong, but mineralization is weak. **Dev:** 365-ft. adit, 70-ft. adit. **Improv:** Bunkhouse, 2,600-ft. tram, bunker, small mill, cabin (1949). **Assays:** Said to run 4% Cu, \$5.00 Au, \$10.00 Ag. **Prod:** Shipped a car of ore valued at \$27 per ton. Produced 1943 (\$146), 1947 (27 tons). **Ref:** 22, p. 11. 68, p. 16. 158.

Veronia (12)

(see under gold)

Whistler (16)

(see under gold)

Yellow Aster

(see under nickel)

YAKIMA COUNTY

Bird (4)

(see under tungsten)

Black Jack (11)

(see under zinc)

Chinook (3)

Loc: SW $\frac{1}{4}$ sec. 12, (16-10E). **Access:** On Chinook Pass highway 1 $\frac{1}{2}$ mi. E. of Chinook Pass. **Prop:** 3 unpatented claims. **Owner:** Hidden Treasure Mines, Inc., Yakima, Wash. (1954—). Orie O. Smalley and H. C. Lawson, Prosser, Wash. (1947). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, with a little arsenopyrite, sphalerite, pyrite, galena, molybdenite. **Gangue:** Granodiorite. **Deposit:** Ore minerals occur in a pocket or lens 4 to 5 ft. wide along the contact of iron-stained granodiorite and andesite. **Dev:** 50-ft. adit, 30-ft. winze with a 15-ft. crosscut, 550-ft. diamond drill hole. **Assays:** 21 tons shipped ran 10% Cu, 27 oz. Ag, \$5 Au. **Prod:** 21 tons shipped to smelter in 1941. **Ref:** 158.

Copper Mining Co. (5)

(see also New Find, Pasco under copper, and Bird, Garibaldi under tungsten)

Loc: Secs. 12 and 13, (15-11E), secs. 7, 8, 17, 18, and 19, (15-12E), on Miners Ridge, Bumping Lk. dist. **Elev:** 4,000 to 6,000 ft. **Access:** 70 mi. by road to Yakima. **Prop:** 42 unpatented claims. **Owner:** Copper Mining Co., Yakima, Wash. (1906—). **Ore:** Copper, tungsten, gold, silver, molybdenum. **Ore min:** Chalcopyrite, arsenopyrite, molybdenite, scheelite, pyrite, bornite, malachite. **Gangue:** Quartz, tourmaline, calcite. **Deposit:** Mineralized quartz veins along shear zones in granite. Mineralization rather sparse. **Dev:** 3 Bird adits, Garibaldi adit, 2 New Find adits, Pasco adit, totaling more than 1,000 ft., numerous open cuts. **Assays:** Tr. Au, 0.60 to 2.00 oz. Ag, 1.15% to 3.35% Cu, tr. to 11.50% WO₃, 0.13% MoS₂. **Prod:** 1907; 11 tons copper conc. (1938); 650 lb. scheelite conc. (1941). **Ref:** 9. 37, pp. 79-84. 41. 59. 97, 1937, p. 654; 1939, pp. 492, 618. 104, 9/15/34, p. 25; 9/30/34, p. 22. 158.

Deep Creek

(see Black Jack under zinc)

Elizabeth Gold Hill (2)

(see under gold)

Gold Hill (1)

(see under gold)

Green

(see Black Jack under zinc)

Hidden Treasure (3A)

(see also Chinook)

Loc: S $\frac{1}{2}$ sec. 4, (16-11E), near Morse Cr. **Access:** On Chinook Pass highway 5 mi. E. of Chinook Pass. **Owner:** Hidden Treasure Mines, Inc., Yakima, Wash. (1954—). **Ore:** Copper, gold, silver. **Ore min:** Chalcopyrite, pyrite, pyrrhotite, sphalerite. **Deposit:** Slight mineralization along joints and disseminated in calcareous siltstone near granite contact. **Dev:** 400-ft. crosscut with 2 drifts, 75 to 100 ft. long. **Ref:** 158.

Keystone (9)

Loc: Approx. in sec. 15, (15-12E), on E. side of Deep Cr. Valley a few hundred ft. above the creek, Bumping Lk. dist. **Elev:** 4,500 ft. **Access:** About $\frac{1}{2}$ mi. by trail from the Deep Cr. road. **Prop:** 12 unpatented claims. **Owner:** William Pemberton and Sam Harlow, Yakima, Wash. (1941). **Ore:** Copper, lead, tungsten. **Ore min:** Chalcopyrite, arsenopyrite, galena, wolframite, scheelite. **Deposit:** A fault zone 30 in. wide is sparsely mineralized. **Dev:** 90-ft. adit. **Ref:** 58, p. 36. 158.

New Find (6)

(see also Copper Mining Co.)

Loc: Near S. line sec. 19, (15-12E), Bumping Lk. dist. **Elev:** 4,300 ft. **Access:** A few hundred yards W. of Copper City, 70

mi. by road from Yakima. **Owner:** Copper Mining Co., Yakima, Wash. (1906—). **Ore:** Copper, gold, silver, tungsten. **Ore min:** Chalcopyrite, arsenopyrite, pyrite, scheelite. **Gangue:** Quartz, tourmaline. **Deposit:** Quartz veins along a fracture zone in granite several feet wide. **Dev:** 2 adits and some open cuts. **Assays:** 11 tons conc. assayed 19.6% Cu, 100 oz. Ag, 1 oz. Au. **Prod:** 11 tons copper conc. (1938). **Ref:** 37, pp. 83-84.

Pasco (7)

(see also Copper Mining Co.)

Loc: NE¼ sec. 19, (15-12E), Bumping Lk. dist. **Elev:** 4,400 ft. **Access:** Road from Copper City. 70 mi. by road from Yakima.

Owner: Copper Mining Co., Yakima, Wash. (1906-1945). **Ore:** Copper. **Ore min:** Chalcopyrite, pyrite, reportedly scheelite, galena (?). **Gangue:** Chlorite. **Deposit:** Iron-stained zone 6 to 8 in. wide. **Ref:** 37, p. 83.

Richmond (8)

(see under lead)

Twin Sisters Lakes (10)

Loc: On W. shore of the larger of the two Twin Sisters Lakes, probably in sec. 35, (15-11E). **Ore:** Copper. **Deposit:** Said to be a large vein. **Ref:** 158.

GALLIUM

Properties—Gallium is an unusual metallic element that is molten on warm days (86° F.) but does not boil below 3600° F. The only other metals that are liquid at similarly low temperatures are mercury, cesium, and rubidium, but none of these has a boiling point nearly so high as that of gallium. The metal is lustrous and grayish white. It is crystalline and hard and has low malleability. Unlike most other metals, it expands upon solidification. The electrical resistivity and coefficient of thermal expansion of gallium vary greatly with the directions of the three axes of its crystallographic structure. Its electrical resistivity is believed to vary more than that of any other metal. Gallium emits electrons at extremely low temperatures. It alloys or amalgamates with many metals, and most of its alloys and amalgams are liquid at room temperatures. Gallium adheres to and spreads as a thin film on glass. It is nonpoisonous to animals. Gallium salts are similar to those of aluminum. Other properties are given in the table on page 12.

Uses—Although gallium has several unusual properties, no quantitatively important uses for the metal have been developed as yet. It is used in dental alloys, in selenium rectifiers, and as a liquid seal on the inlet system of mass spectrometers, where its liquid range and low vapor pressure make it superior to mercury. It is used in direct-reading high-temperature thermometers, as an excitant in phosphors, and experimentally as a catalyst; and radioactive gallium has been used in the diagnosis and treatment of bone cancer. Gallium has been used to put bright reflective film on glass, and to make low-melting-point industrial alloys. A fairly strong solder which melts at 57° C. is made by adding 10 percent mercury and 0.6 percent gallium to bismuth.

Production—In the past few years a few pounds of gallium have been produced annually in the United States as byproducts of smelting aluminum, copper, and zinc. In England the metal is recovered from flue dusts. Although total consumption of the metal for the year 1951 is estimated to be less than 100 pounds, much larger quantities could be produced as a byproduct if and when the demand exists. Production in 1950 came from plants located in Montana, Illinois, Missouri, and New York.

Prices—Gallium in 1932 was quoted at \$2.50 per gram, and by 1936 it could be bought in lots of several pounds at \$1.50 per gram, but in smaller lots the price was \$3.00 a gram. Standard-grade metal for experimental use was still quoted at \$3.00 a gram in 1955. Higher purity (99.9 percent) metal sold at from \$3.00 to \$4.50, depending upon the size of the order. Metal of 99.99-percent purity commanded a premium of 25 cents per gram.

Ore minerals and geology—The richest known source of gallium is the copper mineral, germanite, $\text{Cu}_3(\text{Ge,Ga,-Fe,Zn})(\text{As,S})_4$, which contains up to 2 percent gallium, but it is never mined specifically for its gallium content. Gallium occurs in a variety of ores but usually in small amounts ranging from a trace to 0.1 percent, and usually less than 0.05 percent. The metal is commonly detected in sphalerite, and it is recovered as a byproduct of zinc smelting and refining. Likewise, it has been recovered from copper smelters and from flue dusts in which it accumulates from the burning of gallium-bearing coals. It is recovered from aluminum ores, in which it is a fairly common constituent. It also occurs in some high-alumina clays and ores of iron, chromium, and manganese, and in some pegmatites, almost always in amounts of less than 0.1 percent.

OCCURRENCES

The map showing the numbered gallium occurrences is plate 3, on page 11 in volume 2.

CHELAN COUNTY

Entiat (1)

Loc: Headwaters of Entiat R. **Ore:** Gallium. **Ref:** 158.

Lovejoy (2)

Loc: Sec. 20, (25-21E), ¼ mi. S. of Entiat. **Access:** On highway and railroad. **Prop:** 70 acres deeded land. **Owner:** Harry Lovejoy, 516 Methow St., Wenatchee, Wash. **Ore:** Gallium. **Deposit:** Hornblende gabbro. **Assays:** Owner reports 0.001% to 0.01% gallium by spectrographic analysis. **Ref:** 157.

FERRY COUNTY

Aavestrud (1)

Loc: Republic dist. **Owner:** Ole Aavestrud, Republic Wash. (1949). **Deposit:** A conc. produced by panning contained a trace of gallium. **Ref:** 158.

KING COUNTY

Prufer (1)

Loc: Sec. 27, (25-10E), N. Fk. of Snoqualmie R. **Owner:** Robert Prufer, North Bend, Wash. (1951). **Deposit:** Sample from a basaltic dike contained a trace of gallium. **Ref:** 158.

PEND OREILLE COUNTY

O. K. (2)

(see under silver)

Pend Oreille Mines & Metals Co. (1)

(see under zinc)

STEVENS COUNTY

Advance (2)

(see under zinc)

Black Rock (3)

(see under zinc)

Farmer (4)

(see under zinc)

Lucile (1)

(see under zinc)

New England (5)

(see under zinc)

Old Dominion (6)

(see under silver)

GERMANIUM

Properties—Germanium is a rare metal allied to tin. It is grayish white, lustrous, crystalline, light in weight, hard, and brittle. It is a semiconductor of electricity, a property which is utilized in the manufacture of electronic devices. Germanium expands upon solidification. It amalgamates with mercury and is known to form alloys with aluminum, copper, silver, magnesium, and some other metals. It is resistant to corrosion and is stable in air at temperatures up to 600° C. It has valences of 2 and 4 and forms two corresponding series of compounds. Other properties are shown in the table on page 12.

Uses—Germanium had very few uses for many years, having only minor use in medicine and as magnesium germanate for a phosphor in fluorescent lights. It has been used as a catalyst in the hydrogenation of coal, and as a substitute for silica in making a highly refractive optical glass. It has been used also in making a new type of photoelectric cell. In 1950 the principal use was in the metallic form in diode rectifiers for high-frequency electrical currents in radar and television circuits. Probably the greatest potential use for germanium, and certainly the use in which the greatest interest was being shown in 1952, is in transistors, the three-element electronic devices which act like triode radio tubes for amplifiers. The transistors have advantages over radio tubes in being much smaller, lighter in weight, and longer lived, and in requiring no filament current.

Production—Commercial production of germanium began in this country about in 1941. In 1950 the principal production was as a byproduct of zinc refining at Joplin,

Missouri, but small production was coming from at least two other plants in Pennsylvania and New York. Production was at the rate of 1,000 pounds per year in 1948 but had increased to 6,000 pounds in 1951 and was expanding rapidly. Germanium is recovered from flue dusts in England. Zinc concentrates from the Metaline district in Washington are germaniferous, hence have been shipped to Mississippi Valley smelters, where the germanium is recoverable in horizontal-retort smelters.

Prices—Germanium metal was quoted in 1936 at \$5.50 per gram, and in 1940 at \$4,500 per pound, but by 1946 it had dropped to \$180 per pound. The price then rose until it reached \$340 per pound in 1952. In June 1955 the price was \$295 per pound.

Ore minerals—Germanium occurs in amounts up to 10 percent in germanite, $\text{Cu}_3(\text{Ge,Ga,Fe,Zn})(\text{As,S})_4$. Renierite, similar to germanite except that it contains tin, carries from 6 to 8 percent germanium. Argyrodite, $4\text{Ag}_2\text{S}\cdot\text{GeS}_2$, contains about 7 percent germanium but is very rare, as are all germanium minerals.

Geology—Germanium is widely distributed in nature as a very minor constituent in many common minerals, but rarely is it naturally concentrated enough to be recoverable. It is found in some coals to the extent of about 0.001 percent, and flue dusts from the burning of such coals contain up to 9 percent germanium. The metal is found in some zinc ores, and in the Tri-State district it occurs in amounts from 0.01 to 0.1 percent. It is found in like amounts in some ores of silver, tin, copper, and iron.

OCCURRENCES

The map showing the numbered germanium occurrences is plate 3, on page 11 in volume 2.

PEND OREILLE COUNTY

Pend Oreille Mines & Metals Co. (1)

(see under zinc)

STEVENS COUNTY

Advance (1)

(see under zinc)

Black Rock (2)

(see under zinc)

Farmer (3)

(see under zinc)

New England (4)

(see under zinc)

GOLD

Properties—Gold is bright yellow when pure, but the color intensity varies to lighter or darker with the amount of silver or copper present. Gold powder produced by precipitation or volatilization is violet, purple, or ruby

colored. Gold is very heavy and soft and is the most ductile and malleable of metals. It is a good conductor of heat and electricity, its electrical conductivity being exceeded only by silver and copper. The element is not