

GOLD, SILVER, COPPER, LEAD, AND ZINC IN WASHINGTON

(MINE REPORT)

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The total value of the gold, silver, copper, lead, and zinc recovered from Washington ores and gravels was \$6,739,467 in 1939 compared with \$5,510,440 in 1938, an increase of 22 percent. Substantial gains were recorded in output of gold, silver, and copper but losses in lead and zinc. The total value of the copper produced increased 59 percent and that of the gold and silver each 22 percent; the total value of lead declined 11 percent and that of zinc 4 percent. Except for a brief shut-down during the summer, the Holden mine and mill of the Howe Sound Co. in Chelan County were operated regularly in 1939, and gains at this property accounted for the increases in total output of gold, silver, and copper in the State. The closing of the Azurite plant in February caused a decrease in gold from Whatcom County, but there was a gain in gold from Okanogan County owing to operation of the Alder group near Twisp by the Methow Gold Corporation. Production of gold from the Republic district, Ferry County, increased slightly in 1939, but that from Stevens County decreased as the First Thought cyanide mill was idle. The output of lead and zinc from Pend Oreille County declined slightly as the mine and mill of the Metaline Mining & Leasing Co. were closed in March.

All tonnage figures are short tons and "dry weight"; that is, they do not include moisture.

The value of the metal production herein reported has been calculated at the following prices.

Prices of gold, silver, copper, lead, and zinc, 1935-39

Year	Gold ¹	Silver ²	Copper ³	Lead ³	Zinc ³
	<i>Per fine ounce</i>	<i>Per fine ounce</i>	<i>Per pound</i>	<i>Per pound</i>	<i>Per pound</i>
1935.....	\$35.00	\$0.71875	\$0.083	\$0.040	\$0.044
1936.....	35.00	.7745	.092	.046	.050
1937.....	35.00	.7735	.121	.059	.065
1938.....	35.00	4.646+	.098	.046	.048
1939.....	35.00	5.678+	.104	.047	.052

¹ Price under authority of Gold Reserve Act of Jan. 31, 1934. Treasury legal coinage value of gold from Jan. 18, 1837, to Jan. 31, 1934, was \$20.67+ (\$20.671835) per fine ounce.

² 1935-37: Yearly average weighted Treasury buying price for newly mined silver; 1938-39: Treasury buying price for newly mined silver.

³ Yearly average weighted price of all grades of primary metal sold by producers.

⁴ \$0.646464.

⁵ \$0.678787.

Mine production of gold, silver, copper, lead, and zinc in Washington, 1935-39, and total, 1860-1939, in terms of recovered metals

Year	Mines producing		Ore (short tons)	Gold (lode and placer)		Silver (lode and placer)	
	Lode	Placer		Fine ounces	Value	Fine ounces	Value
1935.....	63	172	32,187	9,739.60	\$340,886	52,338	\$37,618
1936.....	44	106	133,435	12,217.40	427,609	66,900	51,814
1937.....	65	90	294,826	36,310.00	1,270,850	126,304	97,696
1938.....	77	80	901,689	74,175.00	2,596,125	380,938	246,263
1939.....	88	84	1,124,564	90,420.00	3,164,700	442,063	300,067
1860-1939.....			(¹)	1,715,413.00	38,794,778	10,455,685	7,395,579

Year	Copper		Lead		Zinc		Total value
	Pounds	Value	Pounds	Value	Pounds	Value	
1935.....	86,699	\$7,196	206,150	\$8,246	2,159	\$95	\$394,041
1936.....	204,000	18,768	1,680,000	77,280	8,806,000	440,300	1,015,771
1937.....	128,000	15,488	5,660,000	333,940	8,232,000	535,080	2,253,054
1938.....	12,034,000	1,179,332	8,568,000	394,128	22,804,000	1,094,592	5,510,440
1939.....	17,996,000	1,871,584	7,436,000	349,492	20,262,000	1,053,624	6,739,467
1860-1939.....	² 28,766	7,929,093	² 46,818	5,806,138	² 50,408	5,292,434	65,218,022

¹ 1860-1903: Figures not available; 1904-39: 4,758,966 tons produced. ² Short tons.

Gold and silver produced at placer mines in Washington, 1935-39, in terms of recovered metals

Year	Gold		Silver		Total value
	Fine ounces	Value	Fine ounces	Value	
1935.....	1,547.60	\$54,166	263	\$189	\$54,355
1936.....	657.20	23,002	133	103	23,105
1937.....	371.00	12,985	48	37	13,022
1938.....	1,575.00	55,125	218	141	55,266
1939.....	2,261.00	79,135	358	243	79,378

Gold.—The output of recoverable gold in Washington in 1939 increased 22 percent over 1938, owing chiefly to the larger output of copper ore in Chelan County. Gold from copper ore increased 17,414 ounces, but that from gold ore decreased 1,890 ounces. Gold ore treated at cyanidation plants declined in Ferry, Stevens, and Whatcom Counties, but that shipped to smelters increased markedly in Ferry and Okanogan Counties. The output of gold from Ferry County increased slightly, as the gain in gold from crude smelting ore more than offset the decrease from gold ore cyanided. Production of gold in Okanogan County increased sharply as a result of operations at the Alder group near Twisp. Idleness of the cyanidation mill at the Orient property in 1939 was the cause of decreased output of gold from Stevens County, and closing of the Azurite mill in February resulted in a marked decline in the output of gold from Whatcom County. The Holden property in Chelan County was again by far the largest gold producer in Washington, contributing in 1939 more than half of the State total. Other important producers included the Aurum, Knob Hill, Mountain Lion, Quilp, and Republic properties in Ferry County; the Alder property in Okanogan County;

and the Azurite mine in Whatcom County. The State total output of gold ore was 261,651 tons in 1939 compared with 271,557 tons in 1938; it comprised 6,421 tons amalgamated, 161,551 tons cyanided, 2,600 tons concentrated, and 91,079 tons shipped direct to smelters. Production of gold from placer mines increased from 1,575 ounces in 1938 to 2,261 ounces in 1939; as usual, most of it came from operations on bars along the Columbia River in Ferry and Stevens Counties. Mechanical placer equipment (draglines, power shovels, tractor scrapers, etc.) was used at 15 properties and treated 276,325 cubic yards of gravel which yielded 1,876 ounces of gold and 316 ounces of silver, a total recovery of 24 cents per cubic yard.

Silver.—The output of recoverable silver in Washington in 1939 increased 16 percent in quantity over 1938. Silver from copper ore and gold ore increased, but that from silver ore and zinc-lead ore decreased. Copper ore yielded 43 percent of the total silver, gold ore nearly 38 percent, silver ore nearly 15 percent, and lead ore and zinc lead ore 3 percent. Production of silver increased sharply in Chelan and Ferry Counties but decreased markedly in Okanogan County. The Holden mine in Chelan County was again the chief silver producer in Washington, followed by the Aurum and Knob Hill mines at Republic and the Arlington mine in Okanogan County.

Copper.—The output of recoverable copper in Washington increased 50 percent in quantity in 1939 to a new record and, as in 1938, nearly 98 percent of it came from the Holden property of the Howe Sound Co. in Chelan County; the company treated 596,967 tons of gold-copper-silver ore in its 2,000-ton flotation plant and was again by far the largest producer of gold, silver, and copper in the State. Other copper producers included the Sunset and Florence Rae mines in Snohomish County, the Alder and Arlington mines in Okanogan County, the Royal property in Chelan County, and the Chinto mine in Stevens County.

Lead and zinc.—The output of recoverable lead in Washington decreased 13 percent in quantity in 1939 and that of zinc 11 percent. Production of zinc-lead ore, chiefly from two mines in Pend Oreille County, rose slightly, but the grade was lower and less lead and zinc were recovered than in 1938. The 700-ton mill of the Pend Oreille Mines & Metals Co. was operated the entire year, but the 400-ton plant of the Metaline Mining & Leasing Co. was operated only 3 months. A little zinc-lead ore was treated at a test mill in Stevens County. Most of the remainder of the lead output came from the Electric Point mine and other properties in Stevens County.

MINE PRODUCTION BY COUNTIES

Mine production of gold, silver, copper, lead, and zinc in Washington in 1939, by counties, in terms of recovered metals

County	Mines producing		Gold (lode and placer)		Silver (lode and placer)	
	Lode	Placer	Fine ounces	Value	Fine ounces	Value
Asotin		11	171	\$5,985	28	\$19
Benton		4	31	1,085	3	2
Chelan	6	7	48,500	1,697,500	184,059	124,937
Clallam		3	13	455		
Columbia		1	1	35		
Douglas		4	103	3,605	22	15
Ferry	19	8	29,287	1,025,045	159,670	108,382
Grant		4	85	2,975	22	15
King	2		195	6,825	598	406
Kittitas	3	5	69	2,415	152	103
Lincoln		2	26	910	3	2
Okanogan	26	12	7,718	270,130	44,522	30,221
Pend Oreille	2	2	8	280	11,603	7,876
Skamania	1		8	280		
Snohomish	3	3	54	1,890	4,835	3,282
Stevens	19	12	967	33,845	35,917	24,380
Whatcom	7	5	3,179	111,265	629	427
Whitman		1	5	175		
Total, 1938	88	84	90,420	3,164,700	442,063	300,067
	77	80	74,175	2,596,125	380,938	246,293

County	Copper		Lead		Zinc		Total value
	Pounds	Value	Pounds	Value	Pounds	Value	
Asotin							\$6,004
Benton							1,087
Chelan	17,581,327	\$1,828,458					3,650,895
Clallam							455
Columbia							35
Douglas							3,620
Ferry	8,423	876	2,936	\$138			1,134,441
Grant							2,990
King	875	91	2,085	98			7,420
Kittitas	67	7	447	21			2,546
Lincoln							912
Okanogan	149,500	15,548	47,723	2,243			318,142
Pend Oreille			7,018,404	329,865	20,260,558	\$1,053,549	1,391,570
Skamania							280
Snohomish	237,462	24,696					29,868
Stevens	18,279	1,901	364,192	17,117	1,442	75	77,318
Whatcom	67	7	213	10			111,709
Whitman							175
Total, 1938	17,996,000	1,871,584	7,436,000	349,492	20,262,000	1,053,624	6,739,467
	12,034,000	1,179,332	8,568,000	394,128	22,804,000	1,094,592	5,510,440

Gold and silver produced at lode mines in Washington in 1939, by counties, in terms of recovered metals

County	Ore sold or treated	Gold		Silver
		Short tons	Fine ounces	Fine ounces
Chelan	606,143	48,485	184,059	
Ferry	224,455	28,544	159,552	
King	909	195	598	
Kittitas	18	23	146	
Okanogan	23,386	7,574	44,497	
Pend Oreille	259,320		11,603	
Skamania	10	8		
Snohomish	644	41	4,835	
Stevens	3,190	132	35,786	
Whatcom	6,489	3,157	629	
Total, 1938	1,124,564	88,159	441,705	
	901,689	72,600	380,720	

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Gold and silver produced at placer mines in Washington in 1939, by counties, in fine ounces, in terms of recovered metals

County	Sluicing and hydraulic		Dry-land dredges ¹		Total	
	Gold	Silver	Gold	Silver	Gold	Silver
Asotin.....	60	10	111	18	171	28
Benton.....	25	3	6		31	3
Chelan.....	15				15	
Clallam.....	13				13	
Columbia.....	1				1	
Douglas.....	2		101	22	103	22
Ferry.....	10		733	118	743	118
Grant.....	9	1	76	21	85	22
Kittitas.....	46	6			46	6
Lincoln.....	26	3			26	3
Okanogan.....	34	6	110	19	144	25
Pend Oreille.....	8				8	
Snohomish.....	13				13	
Stevens.....	96	13	739	118	835	131
Whatcom.....	22				22	
Whitman.....	5				5	
Total, 1938.....	385	42	1,876	316	2,261	358
	509	68	1,066	150	1,575	218

¹ Dragline and power-shovel excavators with sluices or special amalgamators.

MINING INDUSTRY

The increased output of gold, silver, and copper in Washington in 1939 was due chiefly to normal operations at the Holden property of the Howe Sound Co. The 2,000-ton flotation mill treated 596,967 tons of ore, compared with 371,800 tons in 1938. As a result, the output of both gold and copper established new records for the State. There was a decrease in gold from ore cyanided, but this loss was more than offset by gains in gold from ore smelted and ore concentrated. The Azurite mill in Whatcom County was closed in February 1939 and the First Thought mill in Stevens County was idle all of 1939, but the Knob Hill plant at Republic operated at capacity the entire year. The output of lead and zinc declined slightly owing to the closing of one of the plants at Metaline Falls in March.

ORE CLASSIFICATION

Details of ore classification are given in the chapter of this volume on Gold and Silver.

Ore sold or treated in Washington in 1939, with content in terms of recovered metals

Source	Mines producing	Ore	Gold	Silver	Copper	Lead	Zinc
			<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Dry and siliceous gold ore.....	55	<i>Short tons</i> 261,651	<i>Fine ounces</i> 39,979	<i>Fine ounces</i> 167,388	<i>Pounds</i> 134,417	<i>Pounds</i> 4,165	<i>Pounds</i> -----
Dry and siliceous gold-silver ore.....	1	68	30	1,672	595	2,991	-----
Dry and siliceous silver ore.....	11	5,138	67	65,449	19,615	66,484	-----
Copper ore.....	67	266,857	40,076	234,509	154,627	73,640	-----
Lead ore.....	8	597,957	48,064	192,237	17,841,078	-----	-----
Zinc-lead ore.....	10	400	18	3,279	275	343,051	-----
	3	259,350	1	11,680	20	7,019,309	20,262,000
Total, lode mines.....	88	1,124,564	88,159	441,705	17,996,000	7,436,000	20,262,000
Total, placers.....	84	-----	2,261	353	-----	-----	-----
Total, 1938.....	172	1,124,564	90,420	442,063	17,996,000	7,436,000	20,262,000
	157	901,689	74,175	380,938	12,034,000	8,568,000	22,804,000

METALLURGIC INDUSTRY

The total output of ore from mines in Washington in 1939 was 1,124,564 tons and comprised 6,421 tons treated at amalgamation mills, 161,551 tons treated at cyanidation mills, 864,151 tons treated at concentration plants, and 92,441 tons shipped crude to smelters.

Amalgamation plants.—Five straight amalgamation plants and four combined amalgamation and concentration plants were operated in Washington in 1939 and treated 6,421 tons of gold ore; the chief producers were the Bodie mine in Okanogan County and the Boundary Red Mountain property in Whatcom County.

Cyanidation plants.—The 400-ton straight cyanidation plant of Knob Hill Mines, Inc., at Republic, Ferry County, operated throughout 1939 on ore from the Knob Hill, Mountain Lion, and Quilp mines; and the 100-ton cyanidation and blanket-concentration mill at the Azurite mine in Whatcom County operated 30 days on Azurite ore. The two plants treated 161,551 tons of ore and reported the consumption of 20,043 pounds of sodium cyanide (91-percent grade), 220,800 pounds of calcium cyanide, 34,997 pounds of zinc dust, and 876,093 pounds of lime.

Concentration plants.—The 864,151 tons of ore treated at 14 straight flotation plants comprised 597,127 tons of copper ore treated at 2 plants, 259,350 tons of zinc-lead ore treated at 3 plants, 5,074 tons of silver ore treated at 7 plants, and 2,600 tons of gold ore treated at 2 plants.

Details of the treatment of all ore produced in Washington in 1939 are given in the following tables.

Mine production of metals in Washington in 1939, by methods of recovery, in terms of recovered metals

Method of recovery	Material treated	Gold	Silver	Copper	Lead	Zinc
	<i>Short tons</i>	<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Ore amalgamated.....	6,421	961	344	-----	-----	-----
Ore cyanided.....	161,551	15,481	56,078	-----	-----	-----
Concentrates smelted.....	64,105	49,442	257,345	17,618,979	7,086,370	20,262,000
Ore smelted.....	92,441	22,275	127,938	377,021	349,630	-----
Placer.....	-----	2,261	358	-----	-----	-----
	-----	90,420	442,063	17,996,000	7,436,000	20,262,000
Total, 1938.....	-----	74,175	380,938	12,034,000	8,568,000	22,804,000

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Mine production of metals from amalgamation and cyanidation mills (with or without concentration equipment) in Washington in 1939, by types of mills and by counties, in terms of recovered metals

AMALGAMATION MILLS

County	Ore treated	Recovered in bullion		Concentrates smelted and recovered metal				
		Gold	Silver	Concentrates produced	Gold	Silver	Copper	Lead
Okanogan.....	Short tons 5,321	Fine ounces 541	Fine ounces 299	Short tons 133	Fine ounces 222	Fine ounces 374	Pounds 282	Pounds 1,018
Skamania.....	10	8						
Whatcom.....	1,090	412	45	40	64	88		
Total, 1938.....	6,421 2,071	961 439	344 230	173 58	286 111	462 190	282	1,018

CYANIDATION MILLS

Ferry.....	156,176	13,523	55,876					
Whatcom.....	5,375	1,958	202	7	694	80		
Total, 1938.....	161,551 210,090	15,481 27,061	56,078 57,663	7 24	694 2,344	80 213		
Grand total: 1939....	167,972	16,442	56,422	180	980	542	282	1,018
1938.....	212,161	27,500	57,893	82	2,455	403		

Mine production of metals from concentrating mills in Washington in 1939, by counties, in terms of recovered metals

County	Ore treated	Concentrates smelted and recovered metal					
		Concentrates produced	Gold	Silver	Copper	Lead	Zinc
Chelan.....	Short tons 597,127	Short tons 40,509	Fine ounces 48,012	Fine ounces 182,350	Pounds 17,581,327	Pounds 1,462	Pounds 20,260,558
King.....	900	127	188	415	777	42,735	1,442
Okanogan.....	4,374	416	250	36,683	33,395	7,018,404	1,442
Pend Oreille.....	259,320	22,665		11,603		22,751	
Stevens.....	2,430	208	12	25,752	3,198		
Total, 1938.....	864,151 631,864	63,925 52,253	48,462 31,094	256,803 248,011	17,618,697 11,991,876	7,085,352 8,080,690	20,262,000 22,804,000

Gross metal content of concentrates produced from ores mined in Washington in 1939, by classes of concentrates smelted

Class of concentrates	Concentrates produced	Gross metal content				
		Gold	Silver	Copper	Lead	Zinc
	<i>Short tons</i>	<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Dry gold.....	307	1,168	957	1,100	4,952	-----
Dry silver.....	193	10	23,209	2,470	19,709	-----
Copper.....	40,819	48,234	210,099	18,154,132	24,120	-----
Lead.....	4,500	29	20,845	5,192	6,946,691	108,421
Lead-copper.....	11	1	2,221	1,233	2,082	-----
Zinc.....	18,275	-----	14	-----	422,348	22,514,166
Total, 1938.....	64,105 52,335	49,442 33,549	257,345 248,414	18,164,127 12,364,069	7,419,902 8,538,054	22,622,587 25,562,321

Mine production of metals from Washington concentrates shipped to smelters in 1939, in terms of recovered metals

BY COUNTIES

	Concentrates	Gold	Silver	Copper	Lead	Zinc
	<i>Short tons</i>	<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Chelan.....	40,509	48,012	182,350	17,581,327	-----	-----
King.....	127	188	415	777	1,462	-----
Okanogan.....	549	472	37,057	33,677	43,753	-----
Pend Oreille.....	22,665	-----	11,603	-----	7,018,404	20,260,558
Stevens.....	208	12	25,752	3,198	22,751	1,442
Whatcom.....	47	758	168	-----	-----	-----
Total, 1938.....	64,105 52,335	49,442 33,549	257,345 248,414	17,618,979 11,991,876	7,086,370 8,080,690	20,262,000 22,804,000

BY CLASSES OF CONCENTRATES

Dry gold.....	307	1,168	957	1,059	2,480	-----
Dry silver.....	193	10	23,209	2,100	18,921	-----
Copper.....	40,819	48,234	210,099	17,610,252	12,060	-----
Lead.....	4,500	29	20,845	4,520	6,670,769	-----
Lead-copper.....	11	1	2,221	1,048	1,990	-----
Zinc.....	18,275	-----	14	-----	380,150	20,262,000
Total, 1938.....	64,105	49,442	257,345	17,618,979	7,086,370	20,262,000

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Gross metal content of Washington crude ore shipped to smelters in 1939, by classes of ore

Class of ore	Ore	Gross metal content			
		Gold	Silver	Copper	Lead
	<i>Short tons</i>	<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>
Dry and siliceous gold.....	91, 079	22, 172	109, 857	119, 638	3, 389
Dry and siliceous gold-silver.....	68	30	1, 672	614	5, 966
Dry and siliceous silver.....	64	3	3, 246	411	2, 167
Copper.....	830	52	9, 884	267, 814	-----
Lead.....	400	18	3, 279	340	357, 302
	92, 441	22, 275	127, 938	388, 817	368, 824
Total, 1938.....	57, 664	11, 551	74, 413	43, 748	509, 612

Mine production of metals from Washington crude ore shipped to smelters in 1939, in terms of recovered metals

BY COUNTIES

	Ore	Gold	Silver	Copper	Lead
	<i>Short tons</i>	<i>Fine ounces</i>	<i>Fine ounces</i>	<i>Pounds</i>	<i>Pounds</i>
Chelan.....	9, 016	473	1, 709	-----	-----
Ferry.....	68, 279	15, 021	103, 676	8, 423	2, 936
King.....	9	7	183	98	623
Kittitas.....	18	23	146	67	447
Okanogan.....	13, 691	6, 561	7, 141	115, 823	3, 970
Snohomish.....	644	41	4, 835	237, 462	-----
Stevens.....	760	120	10, 034	15, 081	341, 441
Whatcom.....	24	29	214	67	213
	92, 441	22, 275	127, 938	377, 021	349, 630
Total, 1938.....	57, 664	11, 551	74, 413	42, 124	487, 310

BY CLASSES OF ORE

Dry and siliceous gold.....	91, 079	22, 172	109, 857	116, 035	1, 685
Dry and siliceous gold-silver.....	68	30	1, 672	595	2, 991
Dry and siliceous silver.....	64	3	3, 246	365	1, 903
Copper.....	830	52	9, 884	259, 751	-----
Lead.....	400	18	3, 279	275	343, 051
	92, 441	22, 275	127, 938	377, 021	349, 630

REVIEW BY COUNTIES AND DISTRICTS

Mine production of gold, silver, copper, lead, and zinc in Washington in 1939, by counties and districts, in terms of recovered metals

County and district	Mines producing		Ore sold or treated	Gold			Silver			Copper Pounds	Lead Pounds	Zinc Pounds	Total value
	Lode	Placer		Lode	Placer	Total	Lode	Placer	Total				
				Short tons	Fine ounces	Fine ounces	Fine ounces	Fine ounces	Fine ounces				
Asotin County: Snake River		11										\$6,004	
Benton County: Columbia River		4										1,087	
Chelan County:													
Chelan Lake	1		596,967	48,011		48,011	181,777		181,777	17,572,081		3,631,363	
Columbia River		2			2							70	
Leavenworth	1		160	1		1	573		573	8,346		1,292	
Peshastin Creek	3	2	20	5	5	10	3		3			352	
Wenatchee River	1	3	8,996	468	8	476	1,706		1,706			17,818	
Clallam County: Ozette		3			13							455	
Columbia County: Snake River		1			1							35	
Douglas County: Columbia River		4			103	103			22			3,620	
Ferry County:													
Columbia River		7			742	742		118	118			26,050	
Danville	3		91	11		11	78		78	8,000		1,270	
Enterprise	3		12				383		383	29	2,894	399	
Republic	13	1	224,352	28,533	1	28,534	159,091		159,091	394	42	1,106,722	
Grant County: Columbia River		4			85	85			22			2,990	
King County: Miller River		2	909	195		195	598		598	875	2,085	7,420	
Kittitas County:													
Fish Lake	1		13	16		16	146		146	67	447	687	
Swauk	2	5	5	7	46	53		6	6			1,859	
Lincoln County: Columbia River		2			26	26		3	3			912	
Okanogan County:													
Cascade	1		5,000	708		708	638		638			25,213	
Columbia River		5			119	119		19	19			4,178	
Conconully	3		454	9		9	5,364		5,364	2,596	12,489	4,813	
Methow	10		14,989	6,557		6,557	5,383		5,383	133,192	4,149	247,196	
Myers Creek and Mary Ann Creek	4	2	484	217	9	226	386	3	389	10	21	8,176	
Palmer Mountain	8		2,459	83		83	32,726		32,726	13,702	31,064	28,004	
Similkameen River		5			16	16		3	3			562	
Pend Oreille County: Metaline	2	2	259,320		8	8	11,603		11,603		7,018,404	20,260,558	
Skamania County: Niggerhead	1		10		8	8						280	
Snohomish County:													
Index	1		514	38		38	4,505		4,505	196,154		24,788	
Sultan	2	3	130	3	13	16	330		330	41,308		5,080	
Stevens County:													
Bossburg	1		6				134		134	19	639	123	

GOLD, SILVER, COPPER, LEAD, AND ZINC IN WASHINGTON 475

Chewelah.....	2		136	9		9	5,149		5,149	13,375	1,851		5,288
Columbia River.....		12			835	835		131	131				29,314
Colville.....	2		43	16		16	1,186		1,186	96	4,447	1,442	1,650
Kettle Falls.....	3		448	79		79	2,634		2,634	1,327	2,064		4,788
Northport.....	5		391				775		775	77	317,914		15,476
Orient.....	2		3	17		17	3		3	29	21		601
Springdale.....	4		2,163	11		11	25,905		25,905	3,356	37,256		20,069
Whatcom County:													
Mount Baker.....	3	5	795	409	22	431	109		109	19			15,161
Slate Creek.....	4		5,604	2,748		2,748	520		520	48	213		96,548
Whitman County: Snake River.....		1			5	5							175
Total Washington.....	88	84	1,124,564	88,150	2,261	90,420	441,705	358	442,063	17,996,000	7,436,000	20,262,000	6,739,467

ASOTIN COUNTY

The output of placer gold from Asotin County increased in 1939 owing to the operation of four small dragline and washer plants on bars along the Snake River; the rest of the county output was obtained by small-scale sluicing operations.

BENTON COUNTY

The placer output from bars along the Columbia River near Richland and Paterson decreased slightly in 1939, as the output from the Gone Busted property was less than in 1938.

CHELAN COUNTY

Chelan Lake district.—The Chelan Division of the Howe Sound Co. continued regular activity at the Holden property during 1939, except from July 6 to August 17 when the property was strike-bound. The company mined and milled 596,967 tons of gold-copper-silver ore and was again the leading producer of gold, silver, and copper in Washington. The ore was treated in the 2,000-ton flotation plant, and copper concentrates rich in gold and carrying considerable silver were shipped to Tacoma for smelting. The company reported that mine development in 1939 comprised 13,440 feet of drifts, 5,176 feet of raises, and 21,991 feet of diamond drilling. The 57-percent increase (\$1,317,806) in total value of metal output in the Chelan Lake district was greater than the net gain (\$1,229,027) in the State total value in 1939.

Columbia River district.—A little placer gold was produced in 1939 at two properties on the Columbia River near Malaga.

Leavenworth district.—A car of copper concentrates was shipped to Tacoma in 1939 from the property of the Royal Development Co., 48 miles northwest of Leavenworth and only 8 miles in a direct line over the mountain from the Holden mine; the Royal property is equipped with a 350-ton flotation mill. It was an important producer of copper from 1935 to 1937 but has been idle since March 1, 1937.

Peshastin Creek district.—Small lots of gold ore were shipped to smelters in 1939 from the Black & White, Blewett, and Apex lodes; a little placer gold was reported recovered from two properties.

Wenatchee River district.—Shipments of ore from the Gold King & Macbeth (Keegan Mining & Development Co.) property near Wenatchee ceased early in 1939, after the contract with the Tacoma smelter terminated. From August 16, 1938, to April 17, 1939, the property produced 19,842 tons of highly siliceous low-grade gold ore which was used as flux at Tacoma; the ore was mined from an open-cut and contained 1,358 ounces of gold and 4,164 ounces of silver. Placer gold was reported recovered from three properties on the Wenatchee River near Cashmere and Dryden.

CLALLAM COUNTY

Small-scale sluicing operations on beach sands near Ozette were continued in 1939; most of the gold came from the Yellow Bank property.

COLUMBIA COUNTY

A little placer gold was recovered by sluicing at a bar on the Snake River north of Dayton in 1939.

DOUGLAS COUNTY

The output of gold from placer operations on Columbia River bars in Douglas County increased considerably in 1939 owing to the operation of a bulldozer and sluicing plant on the Hopkins property near Alameda.

FERRY COUNTY

Columbia River district.—Gold production from placer properties along the Columbia River in Ferry County increased markedly in 1939 as the result of work by the Newton Construction Co.; the company used two tractor-scraper units in hauling 90,000 cubic yards of gravel to a washing plant and was the largest placer producer in Washington. Others in the district included small dragline operations at the Fish and Plumb Bar properties and several small-scale sluicing operations.

Danville district.—Shipments of gold ore from the Morning Star mine decreased in 1939. Small lots of copper ore were shipped from the Grand Forks and Gold Cup mines.

Enterprise district.—Small lots of crude ore from the Lucky Boy, Stemwinder, and Tyler properties near Inchelium were shipped in 1939 for smelting.

Republic district.—Mines in the Republic district produced metals valued at \$1,106,722 in 1939, an increase of \$133,818 over 1938. The entire output from lode mines was siliceous gold ore and comprised 156,176 tons treated by cyanidation and 68,176 tons shipped direct to smelters. The ore cyanided came from the Knob Hill and Mountain Lion properties operated by Knob Hill Mines, Inc., and from the Quilp property of the Eureka Mining & Milling Co.; it was treated in the 400-ton cyanide plant at the Knob Hill mine. Most of the crude smelting ore came from leasing operations on property of the Aurum Mining Co.; other producers of smelting ore included the California, El Caliph, Flag Hill, Knob Hill, Morning Glory, Quilp, Republic, Seattle, Valley, Klepinger, and Anecia properties. The Aurum property was the largest gold producer in the district in 1939, followed by the Knob Hill, Mountain Lion, Quilp, and Republic. A little placer gold was recovered by sluicing at the Marcella property on Granite Creek.

GRANT COUNTY

Most of the output of Grant County in 1939 came from the small power-shovel operation of Miller Bros. at Chinaman Bar on the Columbia River; gold was also recovered at three small sluicing operations along the river.

KING COUNTY

Miller River district.—Gold ore from the Apex mine was treated in 1939 in the 75-ton flotation plant of Apex Gold Mines, Inc. A small quantity of gold ore was shipped from the Coney Basin mine for smelting.

KITTITAS COUNTY

Fish Lake district.—A little gold ore was mined at the Silver Creek property north of Cle Elum in 1939.

Swaik district.—Producing placers near Liberty in 1939 included the Black Bar, Deer Gulch, Gold Bar, and Sunny Bar properties. Small lots of gold ore were produced at the North Star and Sonny Brown mines.

LINCOLN COUNTY

Small-scale sluicing operations in 1939 were reported at two properties on the Columbia River north of Wilbur.

OKANOGAN COUNTY

Cascade district.—The entire output of the Cascade district in 1939 was gold ore from the Bodie mine north of Wauconda and was treated by amalgamation and concentration; the property was operated part of the year by the Northern Gold Corporation and later by the Toroda Gold Mines Corporation.

Columbia River district.—The Gold Bar Mining Co. operated a bulldozer and washing plant in 1939 at the Gold Bar on the Columbia River near Kartar, treating 10,045 cubic yards of gravel from April 11 to November 6. Sluicing was reported at the Funk, Gove, Hill, and Lucky Strike properties.

Conconully district.—Silver ore was treated by flotation at two properties near Conconully in 1939—the Sonny Boy mine operated by the Ruby Mountain Mining Co. and the Mineral Hill group operated by Central Mines, Inc.; lead concentrates were produced at both plants.

Methow district.—The value of the metal output of the Methow district increased from \$8,443 in 1938 to \$247,196 in 1939 and accounted for most of the gain in Okanogan County. Operations at the Alder group near Twisp were begun April 22 by the Methow Gold Corporation; the output comprised nearly 13,000 tons of gold ore, containing considerable silver and copper, and copper concentrates from several hundred tons of ore treated in the Red Shirt mill and shipped to Tacoma for smelting. Other producers in the district included the Highland Light, Mazama Pride, Mazama Queen, Mid Range, Gold Crown, and Hyde properties.

Myers Creek and Mary Ann Creek district.—Gold ore was shipped in 1939 for smelting from the Gray Eagle, Mother Lode, Poland China (Overtop), and Harris lode mines. Small-scale sluicing operations were reported at the Ottia May and Davey placers.

Palmer Mountain district.—The value of the metal output of the Palmer Mountain district decreased \$38,271 in 1939, owing chiefly to the closing of the Arlington mine and mill on April 30; the quantity of silver ore treated at the 75-ton flotation plant was only one-third of that in 1938. Other producers in the district included the Four Metals, Grand Summit, John Judge, Golden Zone, Monto Oro, Owasco, and Ruby mines.

Similkameen River district.—Small-scale sluicing operations in 1939 were reported at five placers along the Similkameen River.

PEND OREILLE COUNTY

Metaline district.—The value of the metal output from Pend Oreille County decreased from \$1,473,116 in 1938 to \$1,391,570 in 1939 as the output of both lead and zinc declined. The Pend Oreille Mines & Metals Co. operated the mine and 700-ton flotation plant the entire year and treated 241,624 tons of zinc-lead ore compared with 214,120 tons in 1938, but the output of lead and zinc decreased slightly; the company reported mine development in 1939 comprising 50 feet of shaft, 1,500 feet of drifts, 1,000 feet of tunnel, and 10,000 feet of diamond drilling. The Metaline Mining & Leasing Co. suspended production March 15, 1939, after 17,696 tons of zinc-lead ore had been treated in the 400-ton flotation mill (in 1938 the mill treated 35,064 tons of ore); the company reported 9,174 feet of diamond drilling during the year. A little placer gold was recovered by sluicing at two properties on the Pend Oreille River.

SKAMANIA COUNTY

A little gold ore was amalgamated in 1939 at the Camp Creek property in the Niggerhead district.

SNOHOMISH COUNTY

Index district.—The Sunset Copper Co. was idle in 1939, but lessees shipped 514 tons of crude copper ore from the Sunset mine to Tacoma for smelting.

Sultan district.—Four lots of copper ore were shipped to Tacoma in 1939 by the Florence Rae Mining Co., and a small lot of gold ore was shipped from a prospect. Sluicing operations were reported at three placers on the Sultan River.

STEVENS COUNTY

Bossburg district.—Lessees shipped a test lot of silver-lead ore from the Silver Trail mine north of Colville in 1939 for smelting.

Chewelah district.—The Chinto Mining Co. shipped 130 tons of silver-copper ore in 1939 to Tacoma from the Chinto mine on Eagle Mountain; the company reported 700 feet of drifts and tunnels and 1,500 feet of diamond drilling done during the year. A test lot of silver-lead ore was shipped from the Jay Gould mine.

Columbia River district.—The placer output from bars along the Columbia River in Stevens County in 1939 was about the same as in 1938; most of the 1939 output came from power-shovel or tractor-scraper operations at the Gibson Bar, B & W, Grover, and Valbush placers. Sluicing was reported at eight placers.

Colville district.—A car of silver-lead ore was shipped to the Bunker Hill smelter from the Old Dominion mine in 1939, and a little zinc-lead ore was treated by flotation in a small test mill at the Middleport mine.

Kettle Falls district.—The Silver Queen property of the Ark Mines Co. was operated by lessees about 5 months in 1939, and the quantity of silver ore treated in the 40-ton flotation plant decreased from about 1,700 tons in 1938 to 250 tons in 1939; silver-lead-copper concentrates were shipped to the Bunker Hill smelter. The remainder of the

output of the Kettle Falls district in 1939 was gold ore shipped from two properties.

Northport district.—The output of lead from the Northport district decreased in 1939 as shipments of crude lead ore from the Electric Point mine declined. Crude lead ore was also shipped from the Gladstone Mountain, Lead Trust, and W. J. Bryan mines to the Bunker Hill smelter, and a little silver ore from the Burrus mine was treated in a small flotation mill.

Orient district.—The metal output of the Orient district decreased sharply in 1939 owing to the closing of the 50-ton cyanidation mill of the First Thought Mine Corporation; no ore was milled in 1939 (in 1938 the mill treated 11,668 tons), but considerable development at the mine was reported. The district output in 1939 comprised small lots of gold ore shipped to Tacoma from the Gem and Gold Stake mines.

Springdale district.—The metal output of the Springdale district increased in 1939 as the Deer Trail mine near Fruitland was reopened; the mine and 100-ton flotation plant were operated several months by the Metals Development Co., and silver concentrates and crude silver ore were sent to the Bunker Hill smelter. The remainder of the district output was crude ore shipped from the Cleveland, Double Eagle, and Lucky Boy mines for smelting.

WHATCOM COUNTY

Mount Baker district.—The Boundary Red Mountain mine was idle in 1939, but material cleaned up from former operations was treated by amalgamation and gold valued at more than \$12,000 was recovered. The placer output came from sluicing operations on Ruby Creek.

Slate Creek district.—The value of the metal output of the Slate Creek district dropped from \$429,823 in 1938 to \$96,548 in 1939, owing to the closing of the Azurite mine and mill in February 1939; the mill treated only 5,375 tons of ore in 1939 compared with 36,515 tons in 1938. The mine has been operated under lease by the American Smelting & Refining Co. since 1936. A 100-ton cyanidation and corduroy-table concentration plant was built and placed in operation in November 1936 and since that time it has treated 72,998 tons of gold ore. The remainder of the district output in 1939 comprised gold ore from the Allen Basin group, shipped to Tacoma, and from the Newlight mine, treated by amalgamation and concentration.

WHITMAN COUNTY

A little placer gold was recovered in 1939 by sluicing at a bar on the Snake River near Almota.