

EXCELSIOR MINE
Whatcom County, Washington
(Steelhead Resources, Limited)

GOLD AND SILVER RESERVES
Verification and Interpretation

Prepared for
FMC Gold Company

By
James J. Quinlan
Consulting Mining Geologist

August 15, 1989

FMC GOLD COMPANY
Suite 2720
1801 California Street
Denver, Colorado 80202

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	1
PURPOSE AND SCOPE	2
METHOD	2
COMPARISON OF RESERVE CALCULATIONS	5
Proven and Probable Reserves	5
Possible Reserves	6
Total Reserves	7
Comparison with Previous Reserve Estimates	7
GEOLOGIC/GEOMETRIC CONCLUSIONS	8
RESERVE EXTENSION RECOMMENDATIONS	9

SUMMARY

The configuration of the Excelsior gold-silver deposit and its reserves were determined from 40 north and west looking drill hole, assay cross-sections. These cross-sections, at a scale of 1" to 50', were furnished to FMC Gold Company by the property owner, Steelhead Resources, Ltd.

Blocks at a cut-off grade of 0.020 GEO (gold equivalent ounce) per ton were shaped on overlay sheets for the cross-sections. In calculating the GEO, a silver to gold ratio of 70:1 was used. Seven bench plans, at 60-foot vertical intervals between 1,460 and 1,880 feet, were interpreted from the completed cross-sections.

The deposit, outlined on the cross-sections and bench plans, generally conforms to a synclinal structure recognized in the mid-Jurassic Wells Creek Volcanics. The deposit appears to be stratabound and confined to the Green Tuff, Dark Siltstone, and Felsite Volcanic Breccia units in the Mine Series member of the Wells Creek Volcanics.

Reserves were estimated independently from blocks outlined on the north looking and west looking cross-sections. The variance between reserves estimated in each direction is 752 gold equivalent ounces. The total proven, probable, and possible reserve is 4.25M tons, averaging 0.035 opt gold and 2.30 opt silver. At the silver to gold ratio of 70:1, the GEO grade is 0.068 opt containing a total of 288K gold equivalent ounces.

The deposit is open to the north, northwest, and south, and may be extended in these directions. The deposit is covered by glacial till along its eastern margin on the west side of Wells Creek. Details of the geology on the east side of the Creek are not well known. Based upon available information, however, the mineralized strata appear to project into this area and offer an exceptional prospecting opportunity.

PURPOSE AND SCOPE

The study was undertaken to verify reserves reported by the property owner, Steelhead Resources, Limited (Steelhead), and to interpret the geometry and limits of the deposit as presently outlined. Particular attention was directed towards determining open ends or possible extensions of the deposit. Exploration recommendations and minability studies were beyond the scope of the study.

METHOD

The reserves and geometry of the Excelsior deposit were determined from drill hole, assay cross-sections furnished by Steelhead. The package included two sets of cross-sections at a scale of 1" = 50'. One set looks north. The second set crosses the first at right angles and looks west. The cross sections are at 50-foot intervals and indexed by coordinate lines shown on

A set of eight bench plans at a scale of 1" to 100', was constructed by transferring and correlating cross-sectional data on to Steelhead's computer-generated bench plans. The plans are at 60-foot vertical intervals between elevation 1,460 and 1,880 feet above sea level. The plans depict the folded nature of the deposit.

The cross-sections, bench plans, and block calculations completed during the study have been preserved and placed in FMC's Steelhead file. They form the basis for the conclusions and recommendations contained in this report. Most importantly, they illustrate the form of the deposit and suggest possibilities for extensions.

COMPARISON OF RESERVE CALCULATIONS

The reserve calculation for FMC Gold Company was based on a cut-off grade of 0.02 GEO (70:1 Ag:Au ratio) and a tonnage factor of 12.5 ft³/ ton. The 0.02 GEO cut-off was selected in order to outline the deposit. Additional metallurgical, mining, and economic data are needed before determining a mining grade cut-off.

Proven and Probable Reserves

The proven and probable reserves, as calculated and shown on the north looking sections, checks closely with the reserves calculated on the west looking sections. The reserves, by section, is summarized in Table 1 (North Looking Sections) and Table 2 (West Looking Sections), and the totals are as follows:

CROSS SECTIONS	Proven and Probable Summary						
	TONS	GRADE			CONTAINED METAL		
		SDT	Au opt	Ag opt	GEO opt	Au ozs	Ag ozs
North Looking	2,558,888	0.034	2.29	0.067	88,149	5,870,063	172,005
West Looking	2,494,540	0.036	2.32	0.069	89,970	5,794,072	172,742
Average	2,526,714	0.035	2.31	0.068	89,060	5,832,068	172,374

The variance in contained GEO of 737 ounces represents a difference of 0.4% in comparing north looking to west looking cross-sections. The close check proves adherence to the measurement conventions adopted for the calculation.

Possible Reserves

The tonnage summary of possible reserve blocks, by cross-section, is shown in Table 3, and the totals are as follows:

<u>CROSS-SECTIONS</u>	<u>TONS SDT</u>
North Looking	1,754,260
West Looking	1,678,000
Average	1,716,130

The difference of 76,260 tons is a satisfactory check. The possible reserve has been assigned the same grade as that developed for the proven and probable blocks.

Total Reserve

Combining the proven, probable, and possible reserves yields the following:

Total Reserve (Proven-Probable-Possible)

CROSS SECTIONS	TONS	GRADE			CONTAINED METAL		
		Au opt	Ag opt	GEO opt	Au ozs	Ag ozs	GEO ozs
North Looking	4,313,148	0.034	2.29	0.067	146,647	9,877,109	287,749
West Looking	4,172,540	0.036	2.32	0.069	150,211	9,680,293	288,501
Average	4,242,844	0.035	2.30	0.068	148,429	9,778,701	288,125
Round to	<u>4,250,000</u>	<u>0.035</u>	<u>2.30</u>	<u>0.068</u>			

Comparison with Previous Reserve Estimates

Table 4 shows a comparison of the subject reserves with reserves previously determined by Steelhead and American Mine Services. Steelhead did not use assay data from inclined diamond drill holes in its calculations. American Mine Services' estimate was prepared from U.S. Borax diamond drill data and was made prior to Nooksack Mines' reverse-circulation drilling program but covers essentially the same area.

It will be noted that both the American Mine Services' and Steelhead's estimates, at a 0.02 GEO cut-off (60:1 Ag:Au ratio), show more metal than the subject reserve. This is because the polygonal method used by Steelhead and the block model used by American Mines Services distribute metal over greater volumes than this study's more restrictive geometry allows.

GEOLOGIC/GEOMETRIC CONCLUSIONS

The reserve block shapes and outline of the deposit resulting from this study confirms its strata-bound nature. As suggested by others, the deposit appears to have formed from a submarine exhalative system and can be modeled after the Silbak-Premier deposit near Stewart, British Columbia.

In gross features, the deposit reflects the synclinal structure mapped at the surface. (See the Surface Geologic Map.) As mapped, the axis of the syncline strikes S70°W and plunges southwestward.

Although geologic detail is limited on the cross-sections, gold and silver mineralization appears to be confined to three of five units in the Mine Series member of the mid-Jurassic Wells Creek Volcanics. These units, from bottom to top, are the lower Green Tuff, Dark Siltstone, and Felsic Volcanic Breccia. Overall, mineralization appears to transgress the lithologic units.

The synclinal nature of the deposit is best illustrated on west looking cross-sections between 11,000 E and 10,850 E. It is also evident on bench plans, particularly on the three plans at and below elevation 1,580 feet.

Two major zones of mineralization are recognized; Main zone and Upper zone. Reserve blocks identified with the Main zone occur throughout the drill area. These range in vertical thickness on the cross-sections from 15 feet to over 200 feet and commonly are from 40 to 60 feet thick.

The Upper zone is more restricted and best developed in the vicinity of the old mine workings in the northeastern part of the deposit. The old stopes are within the Upper zone. Usually the Upper zone is separated from the Main zone by an unmineralized interval 50 to 100 feet thick. Where best developed, the Upper zone is 100 or more feet in vertical thickness. Locally, the Main and Upper zones appear to merge and mineralized sections greater than 200 feet thick are recognized.

Zones of thick mineralization may represent vent features or remobilized metal along later fracture and faults.

RESERVE EXTENSION RECOMMENDATIONS

The deposit outlined by present drilling is open to the north, south, and west. The extension of the deposit toward the west near the synclinal axis, however, is likely to be uneconomic because of the increasing stripping ratio in that direction. Bench plans, however, show the deposit is open north and northwest of coordinate 10,450 N. The Main and Upper zones are recognized in hole 87-N-53 at coordinate 10,450 N, 10,820 E. Step-out drilling from this hole is indicated.

An area of higher than average gold content is recognized in the southeastern part of the deposit. Inclined hole 87-N-40 collared near coordinate 9,950 N, 11,230 E intersects 75 feet of mineralization averaging 0.106 opt Au and 0.34 opt Ag in a down-dropped fault block (Cross-Section 9,600 N). Off-set drilling to test the area south of this intercept is recommended.

The deposit is covered by glacial till along its eastern margin on the west side of Wells Creek. Without detailed maps showing the geology east of Wells Creek, it is difficult to appraise the area's geologic potential. The Mine Series rocks project to the east side of Wells Creek and the area offers an exceptional prospecting opportunity.

EXCELSIOR PROJECT
 Whatcom County, Washington
 PROVEN AND PROBABLE RESERVE SUMMARY BY SECTIONS
 (NORTH LOOKING SECTIONS)

August, 1989

TABLE 1
 Prepared from Drill Hole Sections, dated 4/4/89
 (Supplied by Steelhead Resources, Ltd.)

SECTION NUMBER	TONS SDT	GRADE			CONTAINED METAL		
		Au opt	Ag opt	GEO opt	Au ozs.	Ag ozs.	GEO ozs.
9,450 N	22,952	0.035	1.98	0.063	796	45,398	1,444
9,500 N	71,876	0.041	3.36	0.089	2,944	241,177	6,389
9,550 N	108,396	0.024	2.99	0.066	2,566	323,784	7,191
9,600 N	164,440	0.035	2.14	0.065	5,676	351,828	10,702
9,650 N	120,120	0.036	3.70	0.089	4,309	444,775	10,663
9,700 N	89,720	0.041	1.20	0.058	3,696	107,361	5,229
9,750 N	247,900	0.072	3.63	0.124	17,825	900,636	30,691
9,800 N	73,680	0.045	1.85	0.072	3,345	136,266	5,292
9,850 N	79,076	0.029	1.23	0.047	2,303	96,871	3,687
9,900 N	225,680	0.022	1.94	0.050	4,938	437,325	11,186
9,950 N	33,960	0.040	2.49	0.075	1,350	84,475	2,557
10,000 N	77,896	0.022	1.63	0.045	1,703	126,739	3,514
10,050 N	159,800	0.022	1.51	0.044	3,561	242,067	7,019
10,100 N	71,856	0.036	2.63	0.074	2,594	188,648	5,287
10,150 N	129,280	0.027	2.09	0.057	3,484	270,182	7,344
10,200 N	437,036	0.029	2.04	0.059	12,843	891,752	25,582
10,250 N	136,920	0.031	1.51	0.053	4,254	206,908	7,210
10,300 N	90,948	0.058	2.77	0.097	5,240	251,547	8,834
10,350 N	67,880	0.020	1.96	0.048	1,343	133,326	3,248
10,400 N	61,456	0.031	3.19	0.077	1,935	195,937	4,734
10,450 N	88,016	0.016	2.19	0.048	1,444	193,061	4,202
TOTAL	2,558,888	0.034	2.29	0.067	88,149	5,870,063	172,005

EXCELSIOR PROJECT
Whatcom County, Washington
PROVEN AND PROBABLE RESERVE SUMMARY BY SECTIONS
(WEST LOOKING SECTIONS)

August, 1989

TABLE 2
Prepared from Drill Hole Sections, dated 1/9/89
(Supplied by Steelhead Resources, Ltd.)

SECTION NUMBER	TONS SDT	GRADE			CONTAINED METAL		
		Au opt	Ag opt	GEO opt	Au ozs.	Ag ozs.	GEO ozs.
11,300 E	95,460	0.062	0.74	0.072	5,901	71,090	6,917
11,250 E	75,600	0.095	1.40	0.115	7,205	105,642	8,714
11,200 E	161,080	0.056	1.45	0.077	8,982	234,080	12,326
11,150 E	100,400	0.043	1.70	0.067	4,318	171,180	6,763
11,100 E	263,800	0.046	3.17	0.091	12,136	835,508	24,072
11,050 E	348,120	0.047	2.97	0.089	16,322	1,033,118	31,081
11,000 E	214,560	0.031	2.33	0.064	6,582	498,958	13,710
10,950 E	474,480	0.025	2.30	0.058	11,814	1,090,463	27,392
10,900 E	277,900	0.025	2.08	0.054	6,813	578,490	15,077
10,850 E	111,600	0.030	2.54	0.066	3,348	283,318	7,395
10,800 E	183,680	0.018	2.25	0.050	3,337	414,162	9,254
10,750 E	112,360	0.022	2.18	0.053	2,423	245,131	5,925
10,700 E	6,000	0.014	5.70	0.095	84	34,200	573
10,650 E	27,900	0.011	2.61	0.048	295	72,900	1,336
10,600 E	12,000	0.004	3.36	0.052	48	40,280	623
10,550 E	25,600	0.012	2.76	0.051	306	70,752	1,317
10,500 E	4,000	0.014	3.70	0.067	56	14,800	267
TOTAL	2,494,540	0.036	2.32	0.069	89,970	5,794,072	172,742

EXCELSTOR PROJECT
 Whatcom County, Washington

TABLE 3

POSSIBLE RESERVE TONNAGE SUMMARY BY SECTIONS

August, 1989

<u>NORTH LOOKING SECTIONS</u>		<u>WEST LOOKING SECTIONS</u>	
SECTION NUMBER	TONS SDT	SECTION NUMBER	TONS SDT
9,450 N	67,500	11,300 E	32,000
9,500 N	74,760	11,250 E	72,000
9,550 N	111,940	11,200 E	38,000
9,600 N	85,120	11,150 E	92,400
9,650 N	89,000	11,100 E	13,800
9,700 N	43,200	11,050 E	132,000
9,750 N	21,000	11,000 E	58,800
9,800 N	13,000	10,950 E	189,400
9,850 N	25,600	10,900 E	143,200
9,900 N	0	10,850 E	223,600
9,950 N	54,600	10,800 E	78,000
10,000 N	0	10,750 E	244,000
10,050 N	121,000	10,700 E	92,800
10,100 N	120,600	10,650 E	178,000
10,150 N	239,500	10,600 E	90,000
10,200 N	108,000	10,550 E	0
10,250 N	213,300	10,500 E	0
10,300 N	141,440		
10,350 N	70,200		
10,400 N	95,300		
10,450 N	59,200		
TOTAL NORTH	1,754,260	TOTAL EAST	1,678,000

TABLE 4
 EXCELSIOR PROJECT GOLD-SILVER RESERVES SUMMARY
 (Comparison of Subject Reserves with Previous Estimates)
 August, 1989

	Cut-Off Grade opt	TONS SDT	Au opt	Ag opt	GEO/TON	Au OUNCES	Ag OUNCES	GEO	12.5 ft ³ /ton	
									(70:1)	
Steellead Resources Ltd. Data:		(GEO @ 60:1)								
Polygonal Method	0.03 0.02	3,982,165 5,681,833	0.042 0.033	2.604 2.047	0.079 0.062	166,852 186,005	10,368,373 11,628,538	314,972 352,127		
North Looking Vert. X-Sections	0.03 0.02	3,944,368 5,206,592								
American Mine Services		(GEO @ 60:1)								
Data: Block Model	0.03 0.02	5,120,001 7,194,361	0.029 0.024	1.640 1.351	0.052 0.043	148,480 172,666	8,396,802 9,719,582	268,434 311,517		
This Report:		(GEO @ 70:1)								
North Looking Vert. X-Sections	0.02	4,313,148	0.034	2.290	0.067	146,647	9,877,109	287,749		
West Looking Vert. X-Sections	0.02	4,172,540	0.036	2.320	0.069	150,211	9,680,293	288,501		