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1 of 2

WONDER SILVER-GOLD MINING DISTRICT

Churchill County, Nevada

June 5, 1973

F.W. LEWIS CO., 120 GREEN RIDGE DR
RENO, NEV. 89509 Phone 826 2404

F. W. LEWIS COMPANY
120 GREENRIDGE DRIVE
RENO, NEVADA 89509

PHONE: (702) 826-2404

January 7, 1981

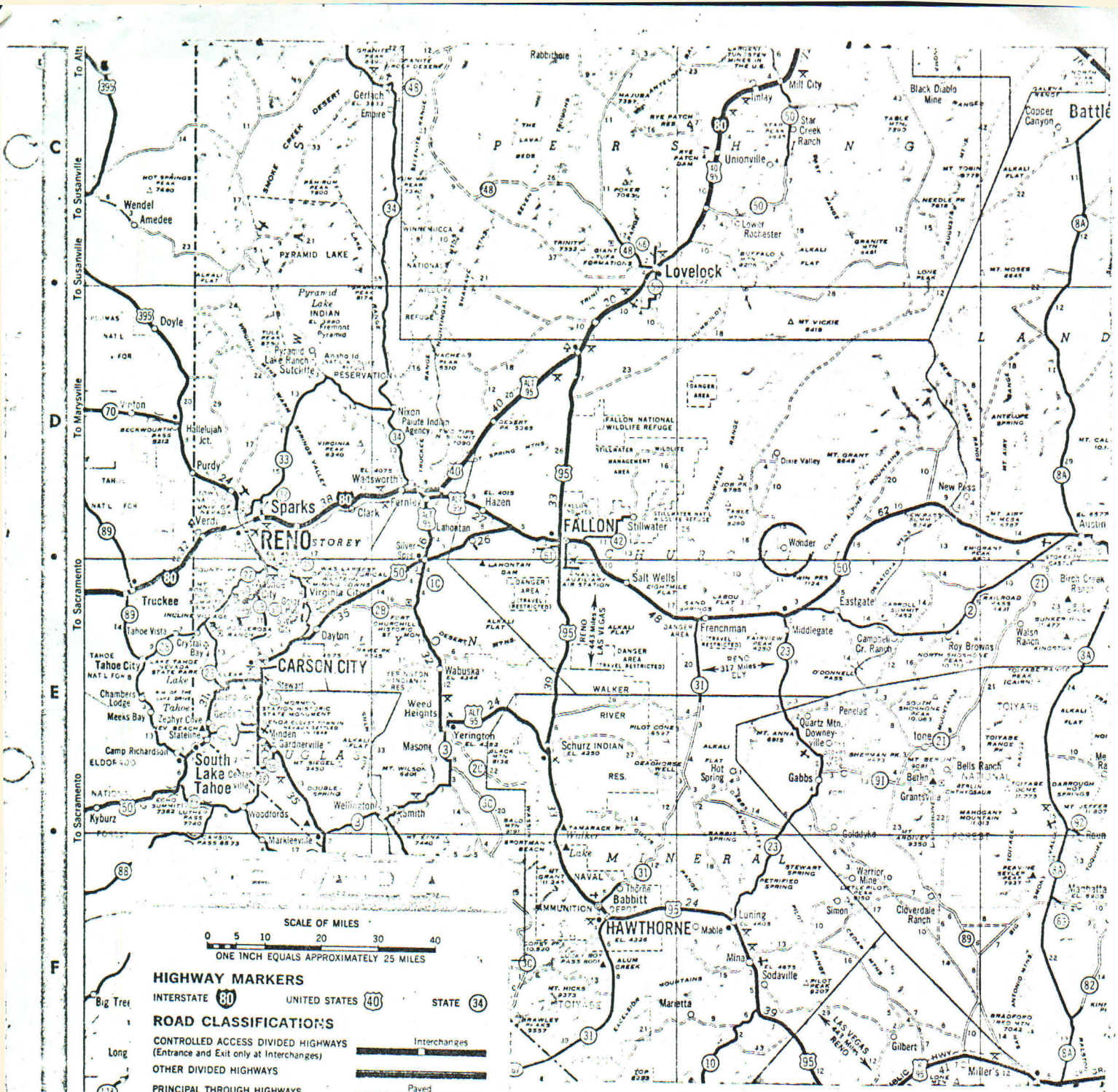
John Schilling
Nevada Burear of Mines
Reno, Nevada

Dear John:

Enclosed are some notes on the Wonder Mine which you may want to ad into the Churchill County file, in Wonder Mining District.

Sincerly,

F. W. Lewis



SCALE OF MILES

0 5 10 20 30 40

ONE INCH EQUALS APPROXIMATELY 25 MILES

HIGHWAY MARKERS

INTERSTATE 80 UNITED STATES 40 STATE 34

ROAD CLASSIFICATIONS

CONTROLLED ACCESS DIVIDED HIGHWAYS (Entrance and Exit only at Interchanges) — Interchanges

OTHER DIVIDED HIGHWAYS

PRINCIPAL THROUGH HIGHWAYS — Paved

OTHER HIGHWAYS — Paved | Gravel | Dirt

LOCAL ROADS — In unfamiliar areas inquire locally before using these roads — Paved | Gravel | Dirt

MILEAGES

MILEAGE BETWEEN TOWNS AND JUNCTIONS 3 4

MILEAGE BETWEEN DOTS 35

LONG DISTANCE MILEAGES SHOWN IN RED

SPECIAL FEATURES

STATE PARKS — With Campsites ▲ Without Campsites △

RECREATION AREAS — With Campsites ▲ Without Campsites △

MOUNTAIN PASSES — Usually closed in Winter)(Usually open in Winter)(

POINTS OF INTEREST

SCHEDULED AIRLINE STOPS

MILITARY AIRPORTS

OTHER AIRPORTS

SELECTED REST AREAS

SKI AREAS

TIME ZONE BOUNDARY .....

COUNTY LINES

POPULATION SYMBOLS

State Capital

Under 1,000

1,000 to 2,500

2,500 to 5,000

5,000 to 10,000

10,000 to 25,000

25,000 to 50,000

50,000 to 100,000

100,000 and over

LOCATION MAP

WONDER MINING DISTRICT

Churchill County, Nevada

June 1973

COOKE, EVERETT & ASSOCIATES, INC.

Map no. 269AF

COOKE, EVERETT & ASSOCIATES, INC.
CONSULTING GEOLOGISTS

421 COURT STREET
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WONDER SILVER-GOLD MINING DISTRICT

Churchill County, Nevada

SUMMARY

The Wonder district, especially the Nevada Wonder mine, offers an outstanding opportunity for mining investment, which should become still more attractive with the probable continuing rise in the prices of gold and silver. It is located in north-central Nevada, one of the few environmentally relaxed areas for mining left in the U.S. It has good access roads, water supply, millsite, and year-around working climate. It made a large and very profitable production when gold and silver prices were less than one-fifth their present levels.

A program to reopen the Nevada Wonder mine is proposed here, at an estimated cost of $750,000. Estimated profits from possible ore are at least $23,700,000 during about 12 years of mine life. The high priority target is the bottom half of the enriched section of the Nevada Wonder ore shoot, which for unknown reasons was left largely unmined. Several other ore targets should also be commercial, and also will be tested.

The Wonder district produced about $6 million in silver and gold, and paid $1.5 million in dividends from 400,000 tons of ore processed in a 200-ton/day cyanide mill during 1911-19. Average grade was about 0.18 oz gold and 18 oz silver, with 93% mill recovery. At present prices ($100/oz gold, $2.50/oz silver), the

value of this production would be $7 million in gold and $17.5 million in silver, or $24.5 million total.

Production came nearly all from the Wonder vein zone, a very strong northwest-striking structure dipping steeply northeast and reaching up to several score feet in thickness. The hanging (east) wall of this zone is formed by the Wonder fault with 30-50 ft of breccia and gouge; a few feet west is the Nevada Wonder vein, much the strongest and richest of the several subparallel veins forming this structure. The principal underground workings, on the Nevada Wonder vein, are now inaccessible because both the Nevada Wonder and Extension shafts are impassable near the surface. However, old production records show that the Nevada Wonder vein with its extensions southeast and northwest, the Extension and Hidden Treasure veins, was mined for 3400 feet laterally and 1300 feet vertically by 8 miles of underground workings. The main Nevada Wonder 3-compartment shaft was sunk to the 1300 L, where the silver enrichment bottomed; 1800 ft southwest, the Extension shaft system was sunk to the 2000 L, the bottom exploration. Nearly all production came from the enriched ore above the 1300 L; the 500-700 L was especially rich. The stope maps delineate two main ore shoots: the Nevada Wonder, stoped to the 700 L, and the Extension, stoped to the 1300 L. Both ore shoots rake steeply northwest.

There is considerable possible ore in several categories, but the principal reserves now apparently are in the Nevada Wonder mine, with an estimated recoverable value of $23,700,000. On present information, such an estimate really is only a guestimate, necessarily involving assumptions about many important variables, such as grade, tonnage, operating costs, and prices of gold and silver. Much of the estimate of possible ore and the proposed program may be changed by feedback information, once testing is begun. Nonetheless, it seems preferable to try to quantify these factors, exploring their derivation and uncertainties, rather than to wait for more reliable data - which might never come unless such present

guestimates are hazarded and tested. Reopening the Nevada Wonder mine is proposed in two stages: Stage 1, underground and surface sampling, costing an estimated $70,000 and taking about 4 months; then, if results are favorable, Stage 2, mine and mill plant installation, costing an estimated $680,000 and taking about a year.

In Stage 1, a pipeline would be laid to deliver water to the mine. The main Nevada Wonder ore shoot would be entered on the 600 L from the Hidden Treasure shaft and sampled in various levels and stopes. Other possible ore, such as near-surface open-cutting ground, would also be sampled, as well as the old dumps and tailings. Milling tests would be made on all ore types. Studies, probably computer-based, would be made to determine the mining and milling methods which would maximize profits.

In Stage 2, a ramp for trackless load-haul-dump vehicles would be run from near the Hidden Treasure shaft, at -30° gradient, to intersect the Nevada Wonder ore shoot below old stoping. A 300-ton/day flotation mill would be built near the portal of the ramp. This should be onstream within about 1-1/2 years from the commencement of the proposed program.

INTRODUCTION

I visited the Wonder district with Claude B. Lovestedt in April, 1972. No important mining had been done for many years, and the main Nevada Wonder shaft and workings had become inaccessible. The information herein therefore, is based mainly on surface examination, earlier reports - principally F. C. Schrader's, and talks with C. B. Lovestedt.

The location, topography, some local geology, claims, mine-workings, and sampling are shown on attached maps 269AF, 269BF, 269CF, 269DF and 269EF. The old workings and claims are shown on detailed maps owned by Frank W. Lewis, as follows:

Nevada Wonder

Claim map (Jovestedt lease)	1 in/500 ft
Wonder claims	1 in/300 ft
Nevada Wonder mine, plan	1 in/100 ft
Nevada Wonder mine, longitudinal section	1 in/100 ft

Assay certificates of our recent sampling are attached in Appendix I, and production records are shown in Appendix II.

LOCATION

The Wonder district is in Churchill Co., Nevada, at 5,000-6,000 ft altitude, on the east flank of the Louderback Mtns. and on the west flank of the Augusta Rg., an offshoot of the Clan Alpine Mtns. It lies mainly in T.19N, R.34E, Sec. 33 and T.19N, R.35E, Sec. 31, M.D.B.&M. Local relief is moderate, incised by steep-sided dry-washes, draining N then W to Dixie Valley.

Nearby timber and water is lacking. Water for the Wonder mines came from Horse Creek in the Clan Alpine Mtns., 6.5 miles N, flowing 60 ft^3/min by gravity with an inverted siphon across the Augusta Rg. Water for the town of Wonder came from Bench Creek, 6.5 miles ENE, flowing 180 ft^3/min, by gravity flow.

No power line passes near Wonder. The U.S. Navy is understood to have proposed a line from Fallon to their bombing range near Frenchman Flat, which would pass 10 miles from Wonder. If built, it might supply power for Wonder.

Winters are cold, with some snow; summers are warm and dry except for occasional thunderstorms and flash floods. Vegetation is sparse, mainly sagebrush and other desert plants. Roads generally are open all year except for a few days of winter snows. Mining regularly was done year-around.

Wonder is reached from Fallon, the nearest large town, by driving E on US Highway 50 for 40 miles, then turning left NNE for 1 mile on the Dixie Valley graded road, then turning right NE for 13 miles on good dirt road to the old town of Wonder.

PROPERTY

The subject property consists of one placer claim and 28 patented claims, as follows:

	Survey No.		Survey No.
T-I Placer		Golden Dawn No. 1	3611
Nevada Wonder	3078	Golden Dawn No. 2	3611
" " No. 2	3325	Golden Dawn No. 3	3671
" " No. 3	4225	" " No. 6	3671
Hidden Treasure	4226	Queen No. 5	3786
Ruby No. 1	3071	" No. 8	3786
" No. 2	3327	Scorpion Iode	3071
Great Eastern	3122	B & S Iode	3072
" " Fraction		Nevadan	3398
" " No. 1	3122	Little Witch	3398
" " No. 3	3122	Silver Tip	3398
" " No. 4 (title poor)"		Valley View	3398
Last Chance No. 1	3124	Pan Handle	3398
SE 1/2 Last Chance No. 2	3326	Yellow Jacket	3398
		North Star Lode	4227

These claims comprise most of the important mining ground in the old Wonder district, including 200,000 tons of old mill tailings 1/2 mile W of the town of Wonder on the T-1 placer claim. The property is owned by Frank W. Lewis, of Reno, and is under lease to Claude B. Lovestedt, of Carson City; the lease runs for 30 years from the date of execution, November 1971, with 6% royalty on net proceeds and $300/month minimum payment, all payments applying on a $1,500,000 end price. It is available for inspection.

The 200,000-ton tailings pond 5 miles NW of Wonder is owned by J. R. Keighley, of Reno.

Water rights to Bench and Horse Creeks are held as follows:

Bench Creek	7764	Dangberg	0.257 ft^3/sec
	303	Wonder Water Co.	5.0
Horse Creek	9428	Reynolds	1.084 ft^3/sec
	1510	Nevada Wonder Mining Co. mining & domestic use	0.28
	0754	Nevada Wonder Mining Co. irrigation	--(not specified)

The Lovestedt lease carries the rights to No. 1510 and 0754, or to 0.28 ft^3/sec water, plus an unspecified additional amount for irrigation.

In the lease, the title of Great Eastern No. 4, Survey 3122, is noted as "poor".

HISTORY

The Wonder district was discovered by Tom L. Stroud in 1906. In November 1906, the Nevada Wonder Mining Co. was formed, mainly by Eastern capital, and production begun. Mining was by open-cutting and underground shrinkage stoping. In 1911 a 200-ton, 10-stamp cyanide mill was built which worked till 1919, producing about $6 million, with 93% recovery, and paying $1,549,005.45 in dividends from some 400,000 tons of ore. The receipts for silver were about three times those for gold. In 1914, 1916 and 1918 small payments were received for copper and lead, both at grades under 0.1%, in concentrates sent to smelters, totalling 5,900 lbs Cu, sold for $1,453, and 4,064 lbs Pb, sold for $276. In 1940, 1284 lbs of Cu were recovered from 756 tons of ore smelted, a grade of 0.085% Cu. Production records now available are included in Appendix II and summarized in Table 1.

Table 1

Summary of production, Wonder district

		Recovered values		Average grade, oz/ton				
				Recovered .93 rcvry		Heads		
Date	Wet short tons	Au, oz.	Ag, oz.	Au	Ag	Au	Ag	Notes
1907-19	392,911	66,264.03	6,351,715	.169	16.2	.181	17.4	Mainly 1911-19, NV Wonder cyanide mill (private report, author?)
1920-42	20,148	5,333.36	375,231	.265	18.6	.283	20.0	Mainly 1938-42 (private report, author?)
1907-42	413,059	71,597.39	6,726,946	.173	16.3	.185	17.5	
1907-37	398,355	69,340.11	6,524,150	.174	16.4	.186	17.6	(Merrill, USBS IC 7093)

At present prices,[1] gold about $100/oz and silver $2.50/oz, the average grade of recorded heads, .185 oz gold and 18.6 oz silver, would be worth $18.50/ton in gold and $46.50/ton in silver, or $65/ton gross metal value.

During the last two years of milling, 1918-19, average grade had dropped to 0.118 oz Au and 11.87 oz Ag, apparently because of a decreasing ratio of enriched Ag ore to the deeper primary sulfide ore. However, the small production by lessees during 1940-42, shipped to outside mills or direct to smelter, ran much higher Au, 0.283 oz/ton, though Ag tenor was the same, 18.8 oz/ton. This may reflect two factors: (1) hand sorting to up-grade the ore shipments, and (2) depletion of the rich silver ore.

The total production of Wonder would have a present market value of about $7 million in gold and $17.5 million in silver, or $24.5 million total. These figures are all minima; much production surely was unrecorded due to incomplete or lost records. High-grading would have removed the best ore, and so lowered recorded grades, as well as recorded production.

Power was brought in by a 150-mile transmission line from Bishop, CA, said to be the longest then in the nation. Water was piped in from Bench and Horse Creeks. The sudden shutdown of the mill in 1919, with no effort to sustain milling by continuing leasing, is hard to understand, particularly when the bottom half of the enriched portion of the Nevada Wonder ore shoot was left essentially unmined, from the 700-1300 L. Presumably the mill shut down due to depletion of available enriched silver ore, but this should have been more than compensated by the rise in silver price: during 1918-1919, grades of ore mined had dropped off about a third in silver and gold from grades during earlier mining, but the price of silver had nearly doubled. In fact, the 1919 silver price, $1.11/oz,

[1] "present prices" in this report are taken at $100/oz Au and $2.50/oz Ag. Both gold and silver prices are now higher and probably will continue to increase rather than decrease; these figures are considered conservative.

not only was the highest to that date, but was to be the highest for over four decades to come.

In 1920, after the mill shutdown, some mining continued, shipping ore direct to smelters with a credited content of 517.57 oz Au and 14,505 oz Ag. Other small smelter shipments were made in several other years during the 1920's. In 1924-1925, Lewis E. Curtis of Reno acquired the NV Wonder; the mill was razed and the machinery sold, and the power transmission line to Bishop was removed. During the 1920's the Jackpot shaft burned, and during the 1930's the Extension shaft burned, both possibly due to spontaneous combustion. In 1931 a lease was taken up by a Tonopah operator. The Nevada Wonder shaft was found to badly need timbering. This was commenced, but discontinued for lack of funds after reaching the 200 L. However, mill and smelter shipments were made totalling about 400 tons, averaging 0.59 oz Au and 33.0 oz Aug per ton. Flotation tests made on near-surface ore by International Smelting Co. gave Au recovery of 91% and Ag 85%.

The Nevada Wonder tailings pond was reported to have been sampled in 1930 by Ernie Gray of Reno at $0.75/ton Au + Ag. During the 1930's and early 1940's, Curtis leased the NV Wonder to various local operators who made small ore shipments to outside mills or direct to smelters. Besides Au and Ag, a little byproduct Cu and Pb was recovered in the smelter, but in amounts indicating grades of less than 0.1%.

Claude Iovestedt said that during 1937-40, the Shaw brothers mined at the S end of the Nevada Wonder workings, and during the same years Jensen mined, mainly on the 400 L and 700-800 L. During 1937-42, McAdan and sons produced some ore. About 25,000 tons was reportedly trucked about 27 miles to the Middlegate mill on US Highway 50.

A cave-in during 1940 stopped work here; the ore was said to be low-grade-- only about $13/ton (at $35/oz Au, $0.40 Ag). Iovestedt said that Stewart renovated the Nevada Wonder shaft, and that Shaw reported the S end of the Nevada Wonder vein was open to the 200 L in the 1930's, and may still be open.

On June 30, 1942, the Wonder mines were shut down by war-time Federal Order L-208. Reportedly, they were subsequently abandoned for taxes. Frank W. Lewis, of Reno, acquired the Nevada Wonder property in the early 1960's, and is the present owner. In November 1971, a 30-year lease was granted to Claude B. Iovestedt. He reported that during the summer of 1972 a fire broke out in the Nevada Wonder shaft, apparently due to vandalism or spontaneous combustion. It probably had already been damaged by earthquakes.

The Wonder vein was explored vertically to 2,000 ft depth, and worked on 13 levels with 3,400 ft of lateral development - in all, over 8 miles of underground workings. The 3-compartment Nevada Wonder shaft was sunk to the 1300 L, but the main stoping from it bottomed at the 700 L. The Extension shaft system, 1,300 ft S of the Nevada Wonder shaft, was sunk to the 2000 L, connecting with the Nevada Wonder shaft and exploring the vein below it. The Extension shaft itself reached only to the 750 L then continued down to the 2000 L via 4 step-off shafts (sub-shafts). Stoping from this shaft system largely bottomed at the 1300 L.

The Nevada Wonder mill, between the Nevada Wonder and Extension shafts, had its tailings pond about 1/2 mile W of the town of Wonder, where some 200,000 tons of tailings remain. About 5 miles NW of the town of Wonder is another tailings pond, containing about 200,000 tons of slime tails. These tailings probably did not come 5 miles from the Nevada Wonder mill, but from another, nearer mill, now removed.

Other mining was done for several miles NW of the Nevada Wonder as indicated by the claims on Map 269 BF:

Jackpot mine - 1.2 miles NNW, 850 ft below the Nevada Wonder shaft collar, sunk to 950 depth, 6,000 ft of workings on four WNW-striking, NE-dipping veins.

Vulture mine - NW of Jackpot, 600-ft adit and 200-ft shaft.

Hercules mine - 4 miles NW of NV Wonder shaft

Jensen shaft & adit - several miles W of Wonder, reported by Lovestedt to have mined 60-ox silver and 10% Cu ore in a 6-inch vein.

Great Eastern district - some 7 miles NW of the Wonder shaft, several small adits, shafts & open-cuts on small high-grade veins.

Small mines and prospects - over a dozen mentioned, principally in Schrader's report.

The Wonder district has been described in many private and published reports, including the following:

Burgess, J.A. - 1913 - Halogen salts of silver at Wonder, Nevada - Econ. Geol. 12, 589-93.

Carpenter, E.E. - ____? - Cyaniding practise of Churchill Milling Co., Wonder, Nevada - Trans. Amer. Inst. Min. & Met. Eng. LII, pp. 123-137.

Davie, Robt. G. - 1910 - Private report.

Lincoln, F.C. - 1923 - Mining Districts and Mineral Resources of Nevada.

Merrill, C.W. - _____? - U.S. Bur. Mines, Information Circular 7093.

Negraw, H.A. - 1913 April 5 - Cyaniding at the Nevada Wonder mills - Eng. & Min. Journ. XCV, 14 693-5.

Paher, S. - 1970 - Nevada Ghost Towns and Mining Camps.

Schrader, F.C. - ____? - Carson Sink area, Nevada (Wonder district).

Smither, T.M. - 1915 May 15 - Stoping methods of the Nevada Wonder mine - Min. & Sci. Press, 757-9.

_____? - 1928 Feb 14 - Min. & Eng. World, p. 432.

_____? - 1936 Jan 2 - The Nevada Wonder mine (private report; maybe by owner at that time, Iouis F. Curtis?).

GEOLOGY AND ORE DEPOSITS

Geology

Schrader described the country rock as Tertiary volcanics,

divided as follows:

Late Tertiary	Basalt flows
	Au-Ag ore deposition
	Andesite
	Extension rhyolite
	Dickey Pk. rhyolite
Middle or early Tertiary	Alpine dacite
	Wonder rhyolite - oldest and most abundant flow, 2,000+ ft thick, main country rock for Au-Ag deposits.

The volcanics are intensely fractured by several fault systems (Schrader), as follows:

Nevada Wonder vein system - NW-striking, steeply NE-dipping, main Au-Ag producer.

N-striking normal faults - strong alteration & mineralization, tilt fault blocks up to E. Kaolinization in four NS belts along topographic gaps probably along such faults.

E-striking alteration zones - in center of Wonder district, probably on faults.

Fault-controlled valleys - many, such as the N-running Hercules Canyon.

Cross-jointing - post-mineral, N290°, dip steeply N.

Block faulting - intermittently active to present time on Dixie Valley & other N-trending faults; earthquakes and scarps in 1906, 1915, 1954; one recent fault scarp passes about 2 miles E of Wonder.

WNW-striking tear fault? - apparently passes just N of Wonder district as seen on ERTS photos; possibly 5+ miles of dextral displacement?

Ore Deposits

Over 50 veins are reported in the Wonder district by Schrader, mainly in the Wonder rhyolite, all highly siliceous, with quartz-adularia gangue, and values in Ag-Au. The district's silver-gold production nearly all came from mineralization in the Wonder rhyolite, and principally from the Nevada Wonder vein. This vein is the NEmost and principal member of the strong NW-striking Wonder vein zone, in which several other veins occur across a width of up

to several score feet. This zone, or branches from it, continues NWward at least for several miles in the Jackpot, Hercules, and Great Eastern mines. Eastward 40 ft from the Nevada Wonder vein is the Wonder fault, a 30 to 50-ft wide crush and gouge zone. The whole Wonder vein and fault system thus appears to represent one major NW-striking fracture zone, dipping steeply NE. Many footwall branch or cross veins occur, but none were reported in the hanging wall. The principal veins mined in the Wonder vein system are:

Nevada Wonder vein - strikes N25°W, dips 75°NE, worked for 3,400 ft laterally, 2,000 ft vertically, up to 40 ft thick.

Badger vein - parallels NV Wonder vein a few feet to SW, but narrower and lower grade.

White No. 1 vein - blind N spurs of Extension vein, with much white quartz.

White No. 2 vein - same

Extension vein - S extension of NV Wonder vein

Hidden Treasure vein - N extension of NV Wonder vein, 60-ft wide crush zone worked to 300 ft depth.

North Star vein - N of Hidden Treasure vein.

Footwall EW or branch veins - one 6-ft branch of the NV Wonder vein ran 26 oz Ag with Pb and Zn values; many small (less than 0.5 ft thick) high-grade veins (0.15 oz/ton Au, 70 oz Ag).

The veins are epithermal. The main gangue is quartz and adularia, and local reddish fluorite. The quartz-adularia is partly pseudomorphous after spar minerals (calcite, barite or fluorite), and often is banded, sheared, brecciated or crushed. Recovered values were nearly entirely in Au and Ag, with occasional byproduct Cu and Pb, apparently in grades below 0.1%. Schrader cites a Au/Ag ratio of 1/40 (by weight?), and a seemingly contradictory ratio of 1/5.3 (1.5/8), by volume. These ratios disagree with the production data, which show a Au/Ag ratio by weight very close to 1/100.

The principal ore minerals are gold, argentite, cerargyrite and halogen salts; the Wonder district was noted for its silver

chlorides and bromides (Burgess, 1913). A little local Cu, Pb and Zn was reported. Over 40 ore minerals, mostly secondary, are described by Schrader. The ore, however, was clean, and free milling. The vein outcrops often form prominent ledges due to their erosion-resistant siliceous gangue, carrying Fe-Mn oxide gossans with Ag salts. The main primary ore minerals are gold, argentite, chalcopyrite, galena, sphalerite, and molybdenite, along with considerable pyrite. Mineralization apparently occurred in late Miocene or Pliocene time, since volcanics of probable middle Tertiary age are mineralized, but the late Tertiary basalt is unmineralized.

Production was almost all confined to the oxidized and enriched zone, which bottomed sharply at about 1300 ft depth, probably marking an old ground water level. In the sulfide zone below, pyrite increased in amount, and quartz and gold decreased. The best values were reportedly on the hanging wall, between the 500 and 700 L., possibly marking another ancient water table. Production from the 700-1300 L was relatively small. The mine was dry to the bottom, at 2000 ft, and cool - about 86°F.

Notwithstanding the thick Wonder vein zone, the NV Wonder vein seems to have been stoped on average only across a 5-ft width:

stoped area (map 269DF) = about 1 million ft^2,
for stope width 5 ft, volume = 5 million ft^3,
with s.g. 2.6, or about 160 lbs/ft^3, wt = about 800 million lbs
= 400,000 tons, the recorded production

However, the actual stope-width no doubt varied from 2 or 3 ft to much more than 5 ft.

The maps owned by Frank Lewis of the underground workings of the Nevada Wonder mine show stoping on two principal ore shoots: the Extension and the Nevada Wonder. Both rake steeply N. The Extension is narrower, but was stoped deeper, to the 1300 L, whereas most stoping on the Nevada Wonder ore shoot was above the 700 L. Possible ore has been demarcated in many places on the longitudinal stope maps, perhaps based on data now unavailable (map 269DF).

Some information on grades was reported by Claude Lovestedt, who was able to enter the main NV Wonder shaft to muck just above the 200 L. He reported getting up to 3 oz Ag from 6 or 8 samples of unselected fines in the open-cut stopes between the NV Wonder shaft and Extension. A sample he took on the 70 L of 30 inches of vein quartz ran $30/ton at 1970 prices (Appendix I, B-1, No. 3). The Shaw brothers reported they found $15 ore on the 200 L (prices at $35/oz Au and about $0.40/oz Ag). Lovestedt said he took two samples on the 200 L, N and W of the main shaft, across a 6-ft back: one at the portal ran 0.06 oz Au and 10 oz Ag, and one 100 ft in the drift ran 0.06 oz Au and 7 oz Ag. A sample from 1000+ tons of muck in a 200 L stope S of the NV Wonder shaft ran 0.03 oz Au, 4.60 oz Ag; a sample of 3000-4000 tons of muck in a 200 L stope N of the NV Wonder shaft and access manway ran 0.05 oz Au, 2.99 oz Ag (Appendix I, B-1, Nos. 1 & 2). The longitudinal stope map has an added ink note indicating 18 inches of 300-oz Ag ore in the Extension ore shoot, between the 1000 and 1150 L, and going on deeper.

The deeper main workings of the Nevada Wonder mine were inaccessible in 1972, so our sampling was done on the surface or in open-cuts or shallow workings. Sampling across 66 ft of the NV Wonder and Badger veins near the NV Wonder main shaft showed less than 0.1 oz Au, and 2.8 - 6.7 oz Ag. The 26-ft horse (CRW5) ran surprisingly low: Au nil, Ag 0.22 oz, considering its very brecciated and mineralized appearance. The low grades found were expectable in the wall of an open-cut left unmined for 67 years beside the main NV Wonder shaft. Also, considerable surface oxidation and leaching of Ag values is likely. Two samples of high-grade selected by Lovestedt ran well in both Au and Ag: CRW7 - Au 0.21 oz, Ag 41.3 oz; CRW8 - Au 0.18 oz, Ag 28.5 oz.

Sampling in the Hercules and Great Eastern areas, CRW10-16, showed low values except for CRW15, ore selected by Lovestedt from near a 60-ft shaft and 80-ft tunnel: Au 0.29 oz, Ag 12.7 oz.

In 1971, Lovestedt sampled the dump on the N side of the

NV Wonder shaft. He took 5-lb samples from the bottoms of 28 2-ft holes spaced on a 20-ft grid. They averaged 0.0087 oz Au and 0.81 oz Ag; at present prices, $0.87 Au and $2.02 Ag, totalling $2.89, or with .85 recovery, $2.46/ton (Appendix I, B-2 &3).

In 1930, when the gold price was $20.67 and silver was $0.30/oz, the tailings pond was reported to have been sampled by Ernie Gray, of Reno, at $0.75/ton Au +Ag. This pond presumably is the one 1/2 mile W of Wonder, reported to contain 200,000 tons. Assuming Au/Ag::1/100, as in the heads, the tailings would run about .014 oz Au and 1.4 oz silver. At $100/oz Au and $2,50/oz Ag this would be $4.90/ton. At 85% recovery this would yield $4.16 values, but recovery of tailings is likely to be less. Iovestedt sampled this tailings pond at 2 oz/ton Ag.

CONCLUSIONS AND RECOMMENDATIONS

Recorded production from the Wonder district is about 70,000 oz gold, with mill heads averaging about 0.18 oz/ton, and 7 million oz silver, averaging about 18 oz/ton, from about 400,000 tons of ore. Considerably more production probably is unrecorded, especially of high-grade.

Faulting, on several fracture or vein systems, has been even more severe than in most Nevada mining districts. The Nevada Wonder vein zone itself follows a strong NW-striking fracture, the Wonder fault, which may have been opened up by renewed tensional stress from dextral movement on an old regional WNW-striking fault north of the Wonder district. Normal block faulting is still continuing in the district, expressed in several historical earthquakes and scarps.

With recent great increases in the prices of gold and silver, the possibility of reopening the Wonder district has become attractive. The unmined bottom half of the NV Wonder ore shoot, in the enriched zone, 700-1300 L, is the prime target. Estimates of present operating costs must be made with few guidelines, as

nearly four decades of frozen gold price has left few operating gold mines in the United States, albeit this situation may be considerably changed within a few months. Also, the condition of the underground workings, which will greatly influence mining costs, is largely unknown. They can be assumed to be dry, but may be considerably damaged by fires, earthquakes or cave-ins. Most important future mining very probably will be underground, since most of the open-cutting ore has been mined. Several men who mined in the NV Wonder after the mill shut down are still alive and have been contacted by Lovestedt, including the Shaw brothers, Jensen, and McAdan, of Fallon, and Bottomley of Iovelock. They probably could supply much additional information about the now inaccessible workings and last production records.

Some operating cost guidelines and estimates are listed following, including my present estimates for Wonder.

Table 2

Operating costs and estimates, dollars

	Homestake estimated, active, 1972	Vanderbilt estimated, inactive, 1971		Wonder, 1973, estimated costs			
		HMT[a]	CEA[b]	CBL[c]	above 1300 L CEA[b]	1300–2000 L CEA[b]	below 2000 L CEA[b]
Mining		3.50	7.50	7.00	7.00	9.00	11.00
Milling		3.50	3.50	3.50	3.50	3.50	3.50
Overhead & Misc.			2.00		2.00	2.00	2.00
Total	10–11±	7.00	13.00	10.50	12.50	14.50	16.50

a – Heavy Metals Technology b – C. B. Iovestedt c – Cooke, Everett & Assoc.

The potential for important ore bodies in the Wonder district warrants serious testing. This would begin with sampling the surface and underground ore – Stage 1; if favorable, then installation of mining and milling facilities – Stage 2.

Stage 1 – examination and sampling: Outcrops and old open-cut exposures can readily be systematically sampled to outline any open-cutting grade ore. However, the only satisfactory way of sampling

the veins and appraising the old underground workings is by reopening and entering them. Drilling would run into problems with old workings and fill, and poor recovery on faults. The Nevada Wonder shaft is now inaccessible, and its rehabilitation would require a major outlay. The condition of the Extension shaft is uncertain, but probably poor since the fire in the 1930's. However, the Hidden Treasure shaft is believed to be in good shape and, as suggested by Lovestedt, should afford the best entry into the old workings. This would be done by opening up the Hidden Treasure shaft and 600 L to enter the workings at this level and below in the NV Wonder ore shoot. These levels then probably could be explored and sampled, using manways left open when mining stopped. Tailings and dumps should be systematically sampled. Mill tests should be made on bulk samples of representative types of surface and underground oxidized and sulfide ores, as well as of tailings and dumps. Water for mining could be obtained from Horse Creek by laying a 6.5-mile pipeline. The Lovestedt leasehold water rights on Horse Creek are for 0.28 ft^3/sec, or 110 gal/min, plus an unspecified additional amount. If needed for milling, much more water probably could be obtained by buying into the Wonder Water Co., which has rights on Bench Creek to 5 ft^3/sec, or 2,244 gal/min. Sufficient water for milling probably could also be developed in Dixie Valley, or in West Gate Wash, some 10 miles S, near US Highway 50.

The pipeline to Horse Creek would be new steel, and probably end up as 2-in diameter, but be possibly larger sizes near the intake. Several miles of it probably could be buried, permitting use of cheaper plastic pipe, costing about $0.16/ft. Its total cost, including inlet, is estimated at about $0.50/ft , or $17,000 for 6.5 miles.

Costs of Stage 1 are estimated as follows:

$20,000	pipeline and pumps, 2 in±, 6.5 miles, Horse Creek
50,000	rehabilitating Hidden Treasure shaft & workings, sampling, mill and feasibility tests
$70,000	

Stage 2 - preparation for mining and milling: Contingent on favorable sampling results from Stage 1, Stage 2 would start with preparatory mining. This probably could best be done by Load-Haul-Dump vehicles using a -30° maximum ramp-grade decline about 1600 ft long, collaring near the Hercules shaft, cutting the main Nevada Wonder ore shoot near the 1000 I, and reaching the 1300 I (map 269DF). This would give 600 ft of backs below the bottom of the major old stoping. LHD ramp hauling now is often preferred to the older shaft and level method because it obviates much equipment and labor in shafts, hoists, rails, and trains, and so may be cheaper both to install and to operate. Several take-off levels probably would be run into the Nevada Wonder ore shoot. The cost of a LHD ramp is estimated at $65/ft, or about $100,000 for 1,600 feet. The cost of take-off levels, exploratory raises and other work preparatory for stoping is estimated at another $100,000. The ore would be mined by shrinkage stoping, using cut-and-fill when necessary.

The proposed millsite is in the valley just N of the Hidden Treasure shaft (map 269BF). The type and size of mill would depend on milling tests made in Stage 1. Provisionally, however, a flotation mill is proposed. A cyanide mill probably would give better recovery, especially on the oxidized ores; average cyanide recovery during production was 93%. However, flotation would be cheaper to install, possibly about half the cost, and should also give good recovery; flotation tests in 1931 gave 91% Au and 85% Ag recovery; and recovery should improve on the deeper sulfide ores which will constitute the main mill feed. Cyanide control is trickier than flotation and requires experienced cyanide men - who have become very scarce. Also, copper is a cyanicide, and is likely to increase in the deeper ores. Flotation, therefore, is recommended pending results of the milling and feasibility tests of Stage 1. The flotation concentrate would be sent to the smelter, and the tails could be recycled into a small cyanide circuit for Au-Ag-Cu extraction.

The recommendation of flotation milling assumes that a reasonably nearby smelter will be operating, as Anaconda's East Helena smelter. If environmental pressures should cause the closing of all available smelters, a cyanide mill would necessarily be the choice.

Good second-hand milling equipment now is available much cheaper than at new prices. A second-hand flotation mill might cost $1000 per ton/day capacity, whereas a cyanide mill might cost at least double this. The size of the mill chosen would depend partly on what good used equipment is found. The sampling and milling tests in Stage 1 would be important guides. Costs per ton decrease and present value of future profits increases considerably with increasing size of mill and production, but capital costs of installing a mill increase approximately linearly with increasing size. Ideally, a computer study would optimize these and some other factors, such as projected costs and prices, to determine the size and type of mill and mining to maximize the present value of expected future profits. Provisionally, a mill of around 300 tons/day capacity should strike a good balance between these factors. At $1000 per ton/day capacity it would cost $300,000. It should be set up so that additional units could be later added for increased capacity, or for a cyanide circuit. A 300-ton flotation mill probably would need 100-150 gal/min of water. The Lovestedt lease carries water rights to 110 gal/min from Horse Creek. If more water is needed it should be available from the sources previously mentioned.

Although a power line passing 10 miles from Wonder may be built soon by the Navy, no nearby power line now exists. Unless the Navy power line is built and available, the mill and camp must be run by diesel power, which could be supplied by two 500-kw Caterpillar diesel engines.

The costs of Stage 2 are estimated as follows:

$200,000	Ramp 1600 ft long and ancillary workings
300,000	Flotation mill, 300 tons/day, with 1000-kw diesel generators
180,000	Underground development, rehabilitation, sampling, tests, possible additional water pipeline, camp construction, roads, office, overhead
$680,000	

The total cost of Stage 1 and Stage 2 would be $750,000. Once the initial $70,000 is committed, testing of Stage 1 could be completed within several months; if this is favorable, installation of the operating plant of Stage 2 should not take over a year, so the mill could be onstream and producing by late 1974.

The principal possibilities for more ore in the Wonder district appear to be the following:

A) Open-cut ore: Some tonnage of open-cutting grade ore probably can be found now that gold and silver prices have increased five-fold, and open-cutting methods are much more efficient than in the old mining. Lovestedt found up to 3 oz Ag/ton in the open-cuts between the NV Wonder and Extension shafts. Silver values may be partly leached, but gold should remain in or near outcrops. Systematic sampling for such ore during Stage 1 investigations may delineate a considerable tonnage of open-cutting ore, but no estimate of grade or tonnage is worthwhile on present data.

B) Nevada Wonder shaft, 700-1300 L: This is the prime ore target. Presumably, it still is in the enriched zone which bottomed at the 1300 L, as described by Schrader and others. Significant stoping from the Extension shaft reached the 1300 L, but stoping from the NV Wonder shaft reached only the 700 L. The tenor of this ore shoot from the 700 to 1300 L should be comparable with that already mined in the Extension ore shoot between these levels. The old stope map shows several notations of "ORE" in Block B ground, and one notation "SULPHIDE ORE" just above the 1300 L.

The reason for apparently leaving the bottom half of the Nevada Wonder ore shoot unmined is unknown. Possibly, relatively low grade ore encountered in sinking below the 700 L was discouraging; Schrader reported that the richest levels were the 500-700 L. In any case, with gold and silver prices now over five times higher, the downward extension of the Nevada Wonder ore shoot is an outstanding target.

The ore should run about the same as the average of old production, 0.18 oz/ton Au and 18 oz/ton Ag, or $63/ton at present prices. Milling recovery of 85% would leave $53/ton recoverable values. With $12.50/ton operating costs (Table 2), operating profit would be $40.50/ton. The stope map shows this block to be about half the area of old stoping, so half the 400,000 tons produced is estimated - 200,000 tons. At $40.50/ton operating profit this would make $8,100,000 total operating profit.

C) Nevada Wonder and Extension ore shoots, 1300-2000 L: The NV Wonder vein zone is proven to extend at least to the 2000 L by exploration on the Extension shaft system. The deeper ground was then uneconomic, presumably because of lower Ag grades below the bottom of enrichment at the 1300 L. Schrader reported that Au grade decreased in the sulfide zone, but, nonetheless, the general gold tenor should hold up there, as well as primary silver values. "ORE" is noted in several places in this block (map 269DF).

The best available guide to grade of the deeper, primary ore probably is that mined in the last two years of milling in 1918-19, when gold grade fell to 0.11 oz/ton and silver to 11.87 oz/ton, apparently due to decreasing enriched ore and increasing primary ore in the mill feed. At present prices this would be $41.47/ton, or after .15 loss in flotation, $35.25/ton. However, the 1918-19 ore probably was sweetened with some upper enriched ore, which is likely to be scarce below the 1300 L. To compensate for this, the estimated recoverable value in Block C is reduced to $30/ton. With mining costs of $14.50/ton (Table 2), operating profit would be $15.50/ton. The longitudinal stope map indicates that at least half as much ore remains on the projection of these two ore shoots from the 1300 to 2000 L as has been mined, i.e., 200,000 tons, which at $15.50/ton would mean $3,100,000 operating profit.

D) Between the two main ore shoots to the 1300 L: The old miners no doubt left this ground a half century ago for one of two sound reasons: (1) it did not pay; or (2) they did not find it. In

either case, the greatly increased precious metal prices and new mining and milling methods may now make much of this ground profitable. The old stope map has a large notation here, "POSSIBLE ORE".

Operating costs here should be about the same as for other shallow mining, estimated at $12.50/ton. The expectable grade would be less than that mined in the ore shoots, possibly around $40/ton Au+Ag instead of $65/ton. Much more ground remains between the two ore shoots above the 1300 L than was stoped, so at least as much ore should remain there as was mined, i.e. 400,000 tons. A metal value of $40 x .85 recovery - $12.50 costs = $21.50/ton operating profit, or $8,600,000 for 400,000 tons.

E) Between the two main ore shoots, 1300-2000 L: This block of ground was explored only on the 1600 L. Its ore possibilities are not as good as the downward extensions of the two known ore shoots, but it has potential for considerable primary low-grade ore. The grade is likely to be lower than Block C above it, or Block B (on either side), perhaps showing an operating profit of some $10/ton. Tons/vertical feet should be similar to that produced: 400,000 tons from 1300 vertical feet = about 300 tons/vertical foot, or 210,000 tons for 700 ft, making $2,100,000 expected operating profit.

F) Below the 2000 L to 3000 ft depth: Exploration bottomed at the 2000 L presumably because the deeper primary ore was not then commercial, rather than because of any sharp change in grade or character of the ore. The Extension shaft system, the only service shaft for the deep workings, must have made ore hoisting very expensive with its 4 step-off shafts: to get ore from the working face of the 200 L to the Extension shaft collar apparently required about 11 handlings! (map 269DF). The primary gold-silver mineralization probably extends considerably deeper than the 2000 L. In an epithermal vein, such deeper ore could expectably continue to 3000 ft or more depth. The tonnage/vertical foot might be much more, or less, than that stoped in the shallower workings. However, assuming it

is roughly the same (300 tons/foot of depth), 1000 ft more depth would mean 300,000 tons. Grade of such deeper ore can only be conjectured. It may be the same as that in Blocks B and D, above it, but more likely both gold and silver will decrease; and copper, and possibly lead, may increase somewhat. With $2/ton more for mining costs, the operating profit thus may decrease to around $6/ton, or $1,800,000 for 300,000 tons.

G) Extension of Wonder vein zone to NW: For several miles NW of Wonder, the Hidden Treasure, Jackpot, Great Eastern, and many smaller mines are located roughly along the projection of the Wonder vein zone. Some of this ground already is controlled by the Lovestedt lease. Important ore bodies may be localized on fractures near the intersection of the Wonder vein zone and the inferred WNW-striking regional fault. This whole section deserves careful study.

H) Other veins: Many nearby veins have been reported, mainly in the footwall of the Wonder vein zone. Only two important crosscuts are shown on the old workings; both on the 1300 L: a 300-ft hanging wall crosscut, and a 400-ft footwall crosscut; the lack of drifting on either crosscut indicates that no commercial vein was cut. However, important nearby veins may remain undiscovered in the walls of the Wonder vein zone.

The two main ore shoots appear to rake about 60°N. The Nevada Wonder ore shoot ends sharply northward, along a N60°-raking line suggesting structural control. No marked roll in the vein is indicated here by the pattern of drifts, so this control might be a vein intersection. Cross-cutting or long-holing from several levels along the strike-length of the Wonder vein zone could test for other veins. If accessible, the crosscuts on the 1300 L should be examined. Veins may have been cut which were not considered worth exploring then; or the maps may not be up-to-date as of the last workings.

I) Dumps: A considerable tonnage now making ore grade may exist in the large waste dumps left from early mining. The dump near

the Nevada Wonder shaft sampled by Claude Iovestedt ran $2.89 Au+Ag values at present prices, or $2.46 recoverable values. This dump should be systematically sampled by drilling or pitting through it to bedrock. The lower part, from the earlier workings, may run better. Even a value of $2 should be profitable to run, once the mill is working.

J) Tailings: The 200,000 tons of tailings were sampled at reported grades of $4.90-5.00/ton Au+Ag, present prices. These would be very profitable to treat if a fair recovery can be made. They should be systematically check-sampled, from surface to bottom.

K) Base metal values: Smelter returns from old production show only negligible quantities of Cu and Pb - less than 0.1%. However, these metals probably will be more abundant in future deeper mining, and may make an appreciable byproduct. They may also be more abundant in the upper levels than indicated by the minor amounts in production records: the old mining would have avoided sulfides, as unamenable to cyanidation, and especially copper, which is a cyanicide.

Of the eleven classes (A-K) of possible ore just considered, (Table 3, p.25) data is now sufficient to estimate total recoverable values for only five - B, C, D, E and F, and even these are really "guestimates" - they may be too high, but more likely are too low. The recoverable values estimated for these four ore types total $23,700,000 from 1,310,000 tons of mill feed for an average of $14.50/ton operating profit. In a 300-ton mill, daily operating profit would range from $1,800 to $6,450, depending on ore grade. Assuming 300 working days/year, the total operating life for ore types B-E would be about 12 years (Table 3). Once a mill is operating, some of the other six ore-types should also become commercially important.

H R Cooke

Dr. H. R. Cooke Jr.
COOKE, EVERETT & ASSOCIATES, INC.

Reno, Nevada
June 5, 1973

CERTIFICATE

I, Dr. H. R. Cooke Jr., do hereby certify that,

1. I am a consulting mining geologist with offices at 421 Court St., Reno, Nevada, doing business as Cooke, Everett & Associates, Inc., of which company I am president.

2. I am a graduate of the Mackay School of Mines, University of Nevada, and received a Ph.D. in mining geology from Harvard University. I am a registered professional engineer in Geological Engineering, Nevada, No. 1420; a Certified Professional Geologist, No. 1633, American Institute of Professional Geologists, and am a member of the American Institute of Mining, Metallurgical and Petroleum Engineers, the Canadian Institute of Mining & Metallurgy, and other professional societies. I have been a practising mining geologist for twenty-eight years.

3. I have no interest, directly or indirectly, in the property covered by this report.

4. This report is based on personal examination of the property in April, 1972, and upon various other information and reports as referred to herein.

H. R. Cooke Jr., Ph.D., P.Eng., CPG

Dated at 421 Court St.
Reno, Nevada
June 8, 1973

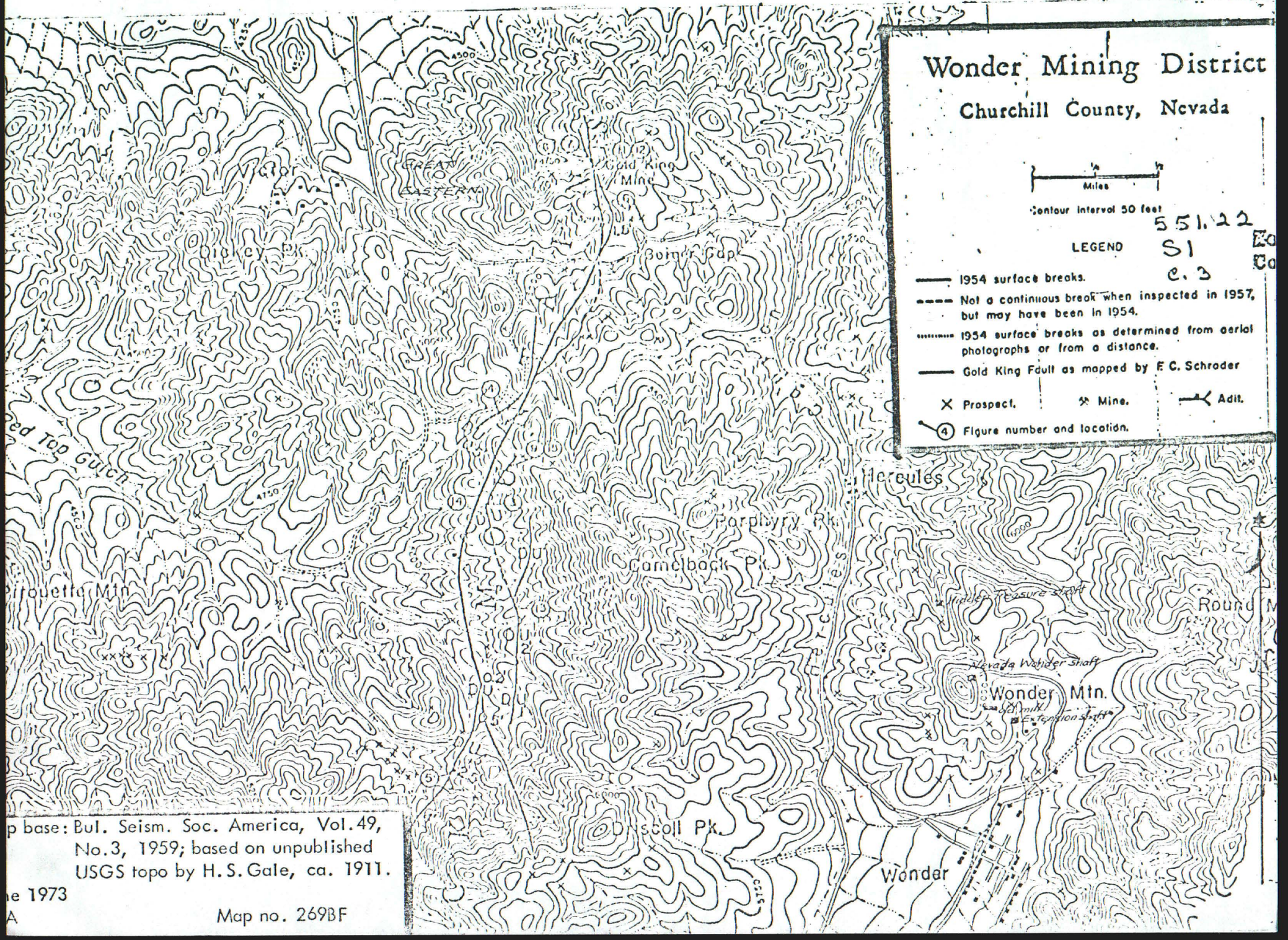
F.W. LEWIS CO., 120 GREEN RIDGE DR.
RENO, NV., 89509 Phone 826 2404

Table 3. Estimated possible ore

Ore type	Grade oz/ton Au	Grade oz/ton Ag	Recoverable[a] value, $/ton present prices[b]	Operating costs $/ton	Operating profit $/ton	Operating profit 300T/day	Short tons	Days life 300T/day	Total recoverable value, $
A. Open-cut									
B. NV Wonder ore shoot, 700-1300 L	.18	.18	53	12.50	40.50	12,650	200,000	667	8,100,000
C. NV Wonder & Extension ore shoots, 1300-2000 L			30	14.50	15.50	4,650	200,000	677	3,100,000
D. Between ore shoots to 1300 L			34	12.50	21.50	6,450	400,000	1,333	8,600,000
E. Between ore shoots, 1300-2000 L				14.50	10.00	3,000	210,000	700	2,100,000
F. 2000-3000 L				16.50	6.00	1,800	300,000	1,000	1,800,000
G. Wonder vein extension NW									
H. Other veins									
I. Dumps (NV Wonder)	.0087	.81?	2.46?						
J. Tailings (NV Wonder)	.014	1.4 ?	4.16?				200,000	677	
K. Base metals									
Ore:							1,310,000	4,366	23,700,000
Tails:							200,000	677	

a - At 85% flotation recovery
b - Gold at $100/oz, silver at $2.50/oz

Present data is insufficient to complete this table.
See map 269DF for locations of ore types.



p base: Bul. Seism. Soc. America, Vol. 49, No. 3, 1959; based on unpublished USGS topo by H. S. Gale, ca. 1911.

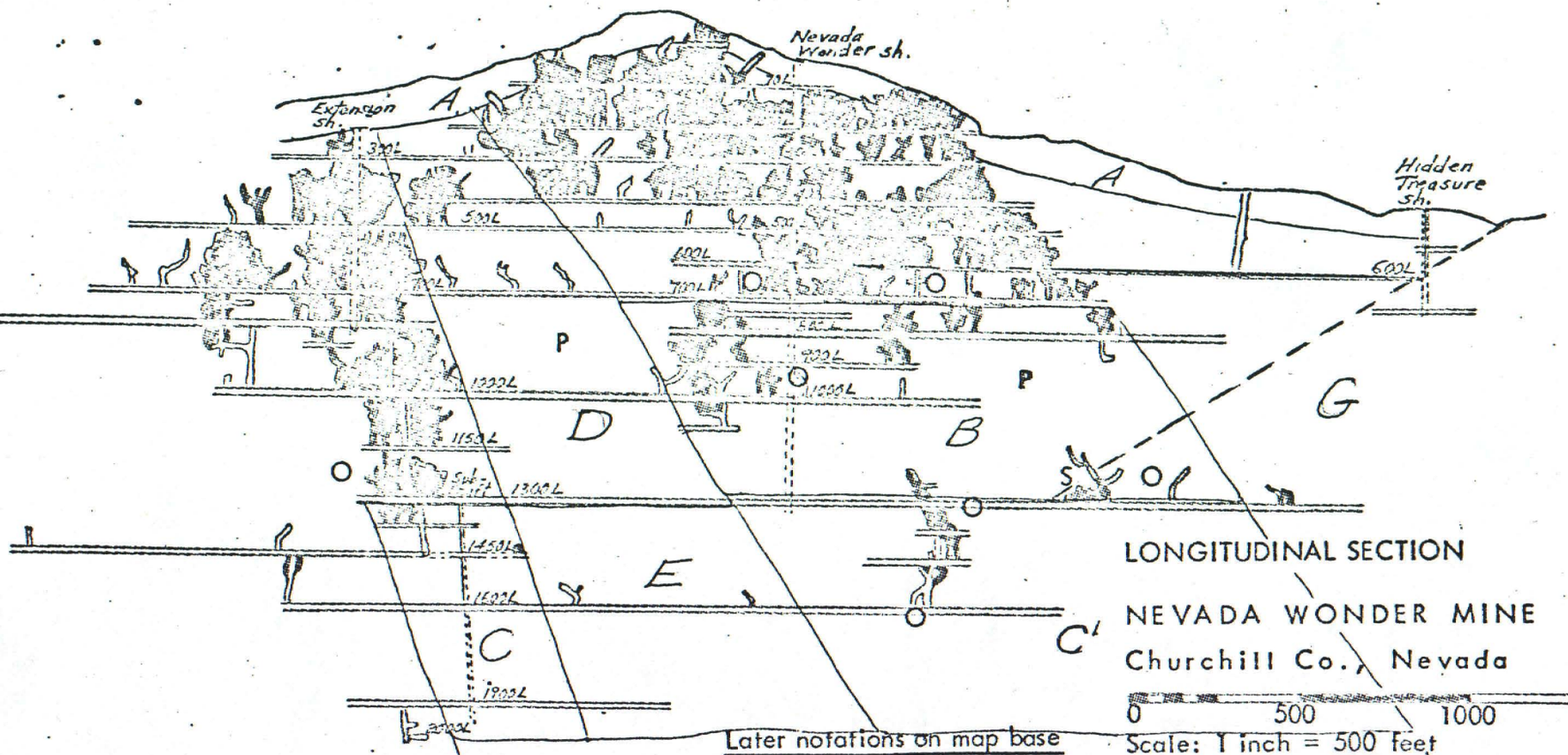
ne 1973

A

Map no. 269BF

SOUTHEAST

NORTHWEST



LONGITUDINAL SECTION

NEVADA WONDER MINE

Churchill Co., Nevada

0 500 1000 1500 ft

Scale: 1 inch = 500 feet

Map base: MAP OF NEVADA WONDER STOPES, Dec. 31, 1919, with later notations; 1 inch = =00 feet

Drafting: R. D. Cooke June 1973

COOKE, EVERETT & ASSOC., INC.

Map no. 269DF

Later notations on map base

O	ore
S	sulfide ore
P	possible ore

Red - Possible ore block

Blue - Stage 1 proposed entry

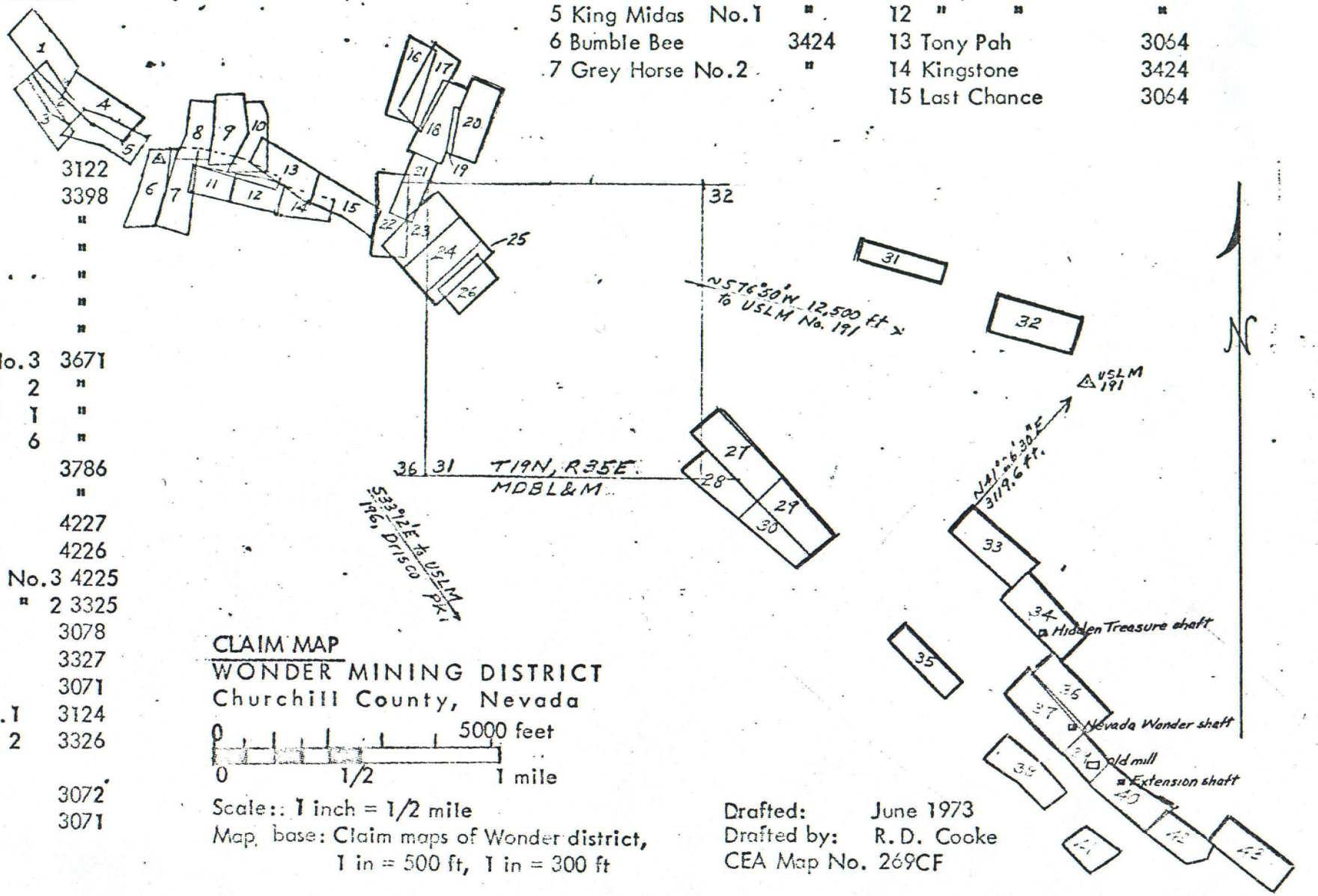
Green - Stage 2 proposed entry

CLAIMS, LOVESTEDT LEASE

16	Great Eastern No. 3	3126
17	" " " 4	3122
18	" " " 1	"
19	" " Fraction	"
20	Great Eastern	3122
21	Little Witch	3398
22	Nevada	"
23	Silver Tip	"
24	Valley View	"
25	Pan Handle	"
26	Yellow Jacket	"
27	Golden Dawn No. 3	3671
28	" " " 2	"
29	" " " 1	"
30	" " " 6	"
31	Queen No. 8	3786
32	" " 5	"
33	North Star	4227
34	Hidden Treasure	4226
35	Nevada Wonder No. 3	4225
36	" " " 2	3325
37	" "	3078
38	Ruby No. 2	3327
39	Ruby No. 1	3071
40	Last Chance No. 1	3124
41	" " " 2 (SE 1/2)	3326
42	B & S	3072
43	Scorpion	3071

CLAIMS, OUTSIDE LOVESTEDT LEASE

1	King Midas	3885
2	" " No. 2	"
3	" " " 3	"
4	Lost Chord	"
5	King Midas No. 1	"
6	Bumble Bee	3424
7	Grey Horse No. 2	"
8	Long Nel	3064
9	Wasp	"
10	Spider	"
11	Grey Horse No. 1	3424
12	" "	"
13	Tony Pah	3064
14	Kingstone	3424
15	Last Chance	3064



CLAIM MAP
WONDER MINING DISTRICT
Churchill County, Nevada

0 5000 feet

0 1/2 1 mile

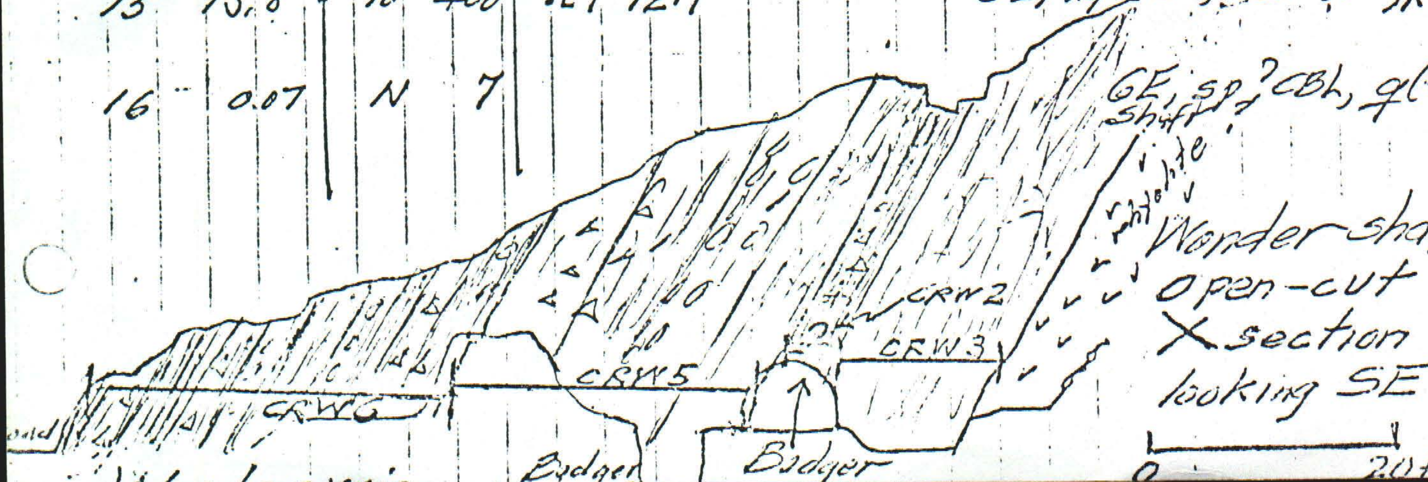
Scale:: 1 inch = 1/2 mile

Map base: Claim maps of Wonder district, 1 in = 500 ft, 1 in = 300 ft

Drafted: June 1973
Drafted by: R. D. Cooke
CEA Map No. 269CF

V[illegible] [illegible]ne samples, 29 IV 72, HR Cooke & CB Loras[illegible]

	Spec comp ~~DCH~~ AA ppm Au	Spec ppm Au	Spec ppm Ag	Fire assay oz Au	Fire assay oz Ag	(Brown Lab ~~[illegible]~~ Grand Junction, Co)	Notes
CRW 1	<.05	N	L				Q ppy 5 mi S of Wonder; py (tr) cubes
2	1.0	N	70	0.005	2.8		Badger v., 4'; gg, q, bx, lmt
3	0.36	N	100	.01	3.6		" " fw, 12'; q(+) lmt
4	0.9	N	300	.03	6.7		Stockpile,? q(+), ylw lmt crusts
5	0.1	N	7	N	.22		Horse, 26'; bx milled, lmt, q
6	1.1	N	50	0.1	4.4		Wonder v., 26'; milled bx, q, lmt, sheared
7	10	10	G 2000	.21	41.3		Hg? (CBL) ~~black~~ lmt crusts, black grains (tr), ylw-or Ox, 2° q druses
8	7.3	10	2000	.18	28.5		Hg, Badger v. fw, 200' abv cut at W. sh
9	0.09	N	L				Xct, 100', hw of W v.; arglzd (+) rhy, q eyes, Si d (loc X)
10	0.39	N	50				Adit 20' Xct near Hercules; sheared, Fe-stnd, py casts (±); 10' bx z nearby
11	0.17	N	30				Great Eastern, hg? (CBL); 1st X trench
12	0.09	N	N				GE, hg? (CBL), N end, mile 4.5
13	>.05	N	L				GE, grab 500' ex NW ridge crest, fresh ±, py casts (tr)
14	0.07	N	5				GE, cut 200' E of main Xct; q, bx, clay alt
15	15.8	10	400	.29	12.7		GE, hg? CBL, near 60' 50' Tc sh, W of main Xc[t]
16	0.07	N	7				GE, sp? CBL, q(+); from 60' shaft?



CEA
June 1973
Map no.
269EF

Appendix IA-1

THE BROWN LABORATORY

2263 Broadway
GRAND JUNCTION, COLORADO 81501

ANALYTICAL DEPARTMENT

Phone 242-4589

CERTIFICATE OF ANALYSIS

TO

Wm. A. Bowes & Associates
P. O. Box 160
Steamboat Springs, Colo. 80477

Date 5/13/72
Order No. 20475-S

Material: Ore Samples
Received: 5/12/72
For: Au/Ag Fire Assays

Lab. No.	Your No.	Description	Ounces Per Ton Gold	Ounces Per Ton Silver	%Cu	%Pb	%Zn
20475-10	27144 CRW3		0.01	3.6			
20475-11	27145 4		0.03	6.7			
20475-12	27147 7		0.21	41.3			
20475-13	27148 8		0.18	28.5			
20475-14	27153 15		0.29	12.7			

COLORADO PRINTING COMPANY

A. D. Brown
Analyst

THE BROWN LABORATORY

2263 Broadway
GRAND JUNCTION, COLORADO 81501

ANALYTICAL DEPARTMENT

Phone 242-4589

Appendix IA-2

CERTIFICATE OF ANALYSIS

TO

Wm. A. Bowes & Associates
Box 160
Steamboat Springs, Colo. 80477

Date 5/20/72
Order No. 20487-S

Material: Ore Samples
Received: 5/19/72
For: Fire Assay

Lab. No.	Your No.	Description	Ounces Per Ton Gold	Ounces Per Ton Silver	%Cu	%Pb	%Zn
20487-1	27139 CRW 2		-0.005	2.8			
20487-2	27140 CRW 6		0.01	4.4			
20487-3	27146 CRW 5		Nil	0.22			

COLORADO PRINTING COMPANY

Analyst

CENTRAL COMSTOCK ASSAY OFFICE
SOUTH F STREET
P. O. BOX 145
VIRGINIA CITY, NEVADA 8944
PHONE: 1341

Appendix IB-1

ASSAY REPORT FOR Nov. 17, 1971

Dest. Wonder MINE

Gold at $______Oz. Silver at______Oz.

Assay No.	Description of Sample	Oz. Au.	Oz. Ag.	Total Value			
1.	S. of NV W Sh. 1090T (?) W- [illegible] Much.	.03	4.60				
2.	W- [illegible] Stope North of						
	[illegible] N of Sh.	.05	2.99				
3.	3000-4000T W- 70. U.H.						
	F.W. Bin 30" Wide	.11	13.93				

Dated______________, 197__

[signature]
Signature of Assayer

CENTRAL COMSTOCK ASSAY CO.
SOUTH F STREET
P. O. BOX 145
VIRGINIA CITY, NEVADA 89440
PHONE: 1341

Wonder shaft dump Appendix IB-2

ASSAY REPORT FOR Nov 15 & 16, 1971

Gold at $____ Oz. DEBIT Wonder. MINE Silver at ____ Oz.

A.R. Lovestedt.

Assay No.	Description of Sample	Oz. Au.	Oz. Ag.	Total Value			
WMSD	#1	Trace	.20				
	2	.005	.32				
	3	.01	.26				
	4	.01	1.30				
	5	.08	0.65				
	6	Trace	0.57				
	7	Trace	0.37				
	8	Trace	0.08				
	9	Trace	0.04				
	10	.003	0.33				
	11	005	0.38				
	12	.03	1.39				
	13	Trace	0.38				
	14	.005	0.44				

Dated _____, 197__

C.A.M.
Signature of Assayer

a two foot hole was dug every 20 ft on a 20 ft grid covering the northerly side of the main shaft dump. a 5 pound sample was taken from the bottom of each hole

Wonder shaft
Pump Appendix I-B3

CENTRAL COMSTOCK ASSAY OFFICE
SOUTH F STREET
P. O. BOX 145
VIRGINIA CITY, NEVADA 89440
PHONE: 1341

ASSAY REPORT FOR Nov 15 + 16, 1971

DEBIT Wonder MINE

Gold at $____ Oz. J. B. Lamont

Silver at ____ Oz.

Assay No.	Description of Sample	Oz. Au.	Oz. Ag.	Total Value			
WMS D.	15	Trace	0.47				
	16	.005	0.43				
	17	.01	0.66				
	18	.005	1.17				
	19	.005	0.94				
	20	.005	0.87				
	21	.005	1.23				
	22	.02	0.95				
	23	.01	1.04				
	24	.005	0.72				
	25	.005	1.14				
	26	.005	1.00				
	27	.005	1.72				
	28	.01	3.55				
		0.0087	0.81				

Dated ____, 197__

Signature of Assayer

(left page)

TABLE 4 - Gold, silver, copper, and lead production from Wonder district, Churchill County, Nevada, 1907-37, in terms of recovered metal (Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines).

Year	Lode					
	No. of mines	Ore, Short tons	Gold		Silver	
			Fine ounces	Value	Fine ounces	Value
1907.....	3	133	356.38	$7,367	10,993	$7,255
1908.....	6	408	362.13	7,486	79,187	41,969
1909-10..	-	-	-	-	-	-
1911.....	1	9,797	2,476.00	51,183	171,900	91,107
1912.....	1	28,376	7,589.87	156,897	474,316	291,704
1913.....	1	41,870	9,534.00	197,085	699,163	422,294
1914.....	4	50,121	9,715.58	200,839	914,547	505,744
1915.....	2	58,399	9,790.83	202,395	1,175,953	596,208
1916.....	3	58,142	8,955.89	185,135	1,023,288	673,323
1917.....	2	55,804	7,512.74	155,302	816,905	673,130
1918.....	5	49,741	4,883.41	100,949	603,528	603,528
1919.....	5	40,604	5,622.71	116,232	467,283	523,357
1920.....	4	1,218	517.57	10,699	14,505	15,810
1921.....	1	2	1.63	34	2	2
1922.....	2	24	14.89	308	1,755	1,755
1923.....	-	-	-	-	-	-
1924.....	1	1	.38	8	86	58
1925.....	-	-	-	-	-	-
1926.....	1	100	102.67	2,122	902	563
1927-30..	-	-	-	-	-	-
1931.....	3	416	245.20	5,069	13,377	3,879
1932.....	1	200	13.80	285	214	60
1933.....	-	-	-	-	-	-
1934.....	4	1,697	1,173.76	41,023	2,619	1,693
1935.....	2	233	42.76	1,497	14,648	10,528
1936.....	3	364	133.86	4,685	14,009	10,850
1937.....	3	705	294.00	10,290	24,970	19,315
Total.	-	398,355	69,340.11	1,456,890	6,524,150	4,494,132
			0.176 oz/T	$21.01/oz	16.4 oz/T	$0.69/oz

APPENDIX IIA-2

I. C. 7093

(right page)

TABLE 4.- Gold, silver, copper, and lead production from Wonder district, Churchill County, Nevada, 1907-37, in terms of recovered metal (con.

(Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines)

Year	Lode					
	Copper		Lead		Total value	Average recoverable value of ore per ton 1/
	Pounds	Value	Pounds	Value		
1907.....	-	-	-	-	$14,622	$109.94
1908.....	-	-	-	-	49,455	121.21
1909-10...	-	-	-	-	-	-
1911.....	-	-	-	-	142,290	14.52
1912.....	-	-	-	-	448,601	15.81
1913.....	-	-	-	-	619,379	14.79
1914.....	-	-	62	$2	706,585	14.10
1915.....	-	-	-	-	798,603	13.67
1916.....	4,564	$1,123	3,350	231	859,812	14.79
1917.....	-	-	-	-	828,432	14.85
1918.....	1,336	330	602	43	704,850	14.17
1919.....	-	-	-	-	639,589	15.75
1920.....	-	-	36	3	26,512	21.77
1921.....	-	-	-	-	36	18.00
1922.....	-	-	-	-	2,063	85.96
1923.....	-	-	-	-	-	-
1924.....	-	-	-	-	66	66.00
1925.....	-	-	-	-	-	-
1926.....	-	-	-	-	2,685	26.85
1927-30...	-	-	-	-	-	-
1931.....	-	-	-	-	8,948	21.51
1932.....	-	-	-	-	345	1.73
1933.....	-	-	-	-	-	-
1934.....	-	-	270	10	42,726	25.18
1935.....	-	-	-	-	12,025	51.61
1936.....	-	-	-	-	15,535	42.68
1937.....	-	-	-	-	29,605	41.99
Total	5,900	1,453	4,320	289	5,952,764	14.94

1/ Not to be confused with average assay value of ore.

APPENDIX IIB-1

PRODUCTION OF NEVADA WONDER MINE

"Schedule A"

*Tons Produced	**Price Gold	**Price Silver	*Year Produced	*Yearly Production Gold oz.	Silver oz.	Cu lbs.	Per Ton Gold oz.	Silver oz.	Cu%
88 smelted	$20	$ .65	1907	111.48	8,346		1.266	94.80	
59 smelted		.52	1908	112.63	3,783		1.900	64.11	
		.51	1909						
		.53	1910						
9,797 milled		.53	1911	2,476.00	171,900		.253	17.55	
28,376 milled		.60	1912	7,523.87	472,958		.265	16.83	
1 smelted		.60	1912	66.00	1,358		66.000	1358.00	
41,870 milled		.59	1913	9,534.00	699,163		.228	16.85	
50,115 milled		.54	1914	9,704.00	914,511		.194	18.24	
58,394 milled		.49	1915	9,779.00	1,175,839		.167	20.33	
58,131 milled		.65	1916	8,955.31	1,023.046		.154	17.60	
55,800 milled		.81	1917	7,512.74	816,852		.135	14.63	
49,710 milled		.96	1918	4,618.00)	557,924)		.098	12.34	
smelted		.96	1918	259.00)	43,741)				
40,570 milled		1.11	1919	5,612.00	462,294		.138	11.39	
8 smelted		1.00	1920	2.88	284		.360	35.50	
		.62	1921						
3 smelted		.67	1922	2.89	394		.963	131.33	
		.64	1923						
		.66	1924						
		.69	1925						
100 smelted		.62	1926	102.67	902		1.030	9.20	
		.56	1927						
		.58	1928						
		.52	1929						
		.38	1930						
83 milled		.28	1931	31.59	2,484		.380	29.93	
329 smelted		.28	1931	206.44	10,270		.627	31.52	
		.27	1932						
		.34	1933						
	35	.47	1934						
35 smelted		.64	1935	6.32	509		.181	14.54	
292 smelted		.45	1936	119.57	8,787		.409	30.10	
588 smelted		.44	1937	271.00	19,901		.461	33.84	
1,419 smelted		.43	1938	573.00	39,242		.404	27.66	
2,227 milled		.39	1939	388.00	29,852		.174	13.40	
3,378 smelted		.39	1939	1,237.00	84,678		.366	25.06	
4,871 milled		.34	1940	1,192.00	85,373		.245	17.52	
756 smelted		.34	1940	220.00	21,227	1284	.298	28.07	8½
4,388 milled		.34	1941	781.00	56,535		.178	12.88	
1,671 milled		.38	1942	199.00	14,793		.119	8.85	
413,059		Total Produced		71,597.39	6,726,946		Average .433	32.60	
							2.852	78.22	
							1,423	29.00	not big one

Total Production in Dollars:

Gold	@ $35.00	$ 2,505,908.65
Silver	@ $ 1.293	8,697,941.18
Total Values		$11,203,849.83

Mine closed
June 30, 1942.

*United States Department of Interior
Bureau of Mines
450 Golden Gate Avenue
Box 36012
San Francisco, California

**Historical Statistics of the United States
Prepared by Bureau of the Census

W. A. BOWES & ASSOCIATES
P. O. BOX 160, Steamboat Spgs.
Colorado 80477

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH
Fe, Mg, Ca, Ti, Na, K, Si & AL reported in %, all other elements reported in PPM

FILM C-11
DATE 5-8-72
Appendix IA-4

Sample No.	Office No.	Field No.	Au	Ag	Cu	Pb	Zn	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	Na	K	Si	Al	P
0	Reference	7080	N	30	1000	G 10%	3000	100	2.	N	30	30	100	N	N	500	70	100	N	N	100	L	2000	3	50	L	N	200	N	L	.3	.3	L	6.	30.	7.	.1
1	27138	CRW-1	N	L	7	50	N	N	2.	N	5	N	50	N	N	N	100	50	N	N	100	L	1000	2	N	L	N	200	N	.3	.2	.2	3.	4.	30.	6.	L
2	27139	CRW-2	N	70	15	30	N	5	.7	N	5	N	70	N	N	N	150	20	N	N	100	L	100	5	N	L	N	L	N	.1	.1	.05	N	1.	50.	3.	L
3	27140	CRW-6	N	50	10	20	N	10	L	N	5	N	100	N	N	N	100	50	N	N	200	L	700	3	N	L	N	100	N	.1	.2	.3	L	2.	50.	5.	L
4	27141	CRW-9	N	1	20	50	N	5	5.	N	5	N	20	N	N	G	200	70	N	N	200	10	1000	2	N	L	N	L	N	.3	.3	.3	L	3.	30.	6.	L
5	27142	CRW-13	N	N	10	20	N	L	1.5	N	5	N	50	N	N	N	150	50	N	N	100	L	1000	2	N	L	N	100	N	.7	.1	.3	2.	3.	50.	6.	L
6	27143	CRW-16	N	1	15	20	N	N	1.	N	5	N	70	N	N	N	150	30	N	N	50	L	500	5	N	L	N	L	N	.1	.05	.1	.5	2.	50.	3.	N
7			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	Lower Detection Limit *	10	0.5	5	10	200	5	0.05%	50	5	10	20	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.05	0.02%	.001%	0.2%	0.5%	1%	0.5%	.1%

N - Not detected L - Detected, but below limit of determination G - Greater than value shown

REMARKS 6 only for Spec.
16 samples total. Fire assay & AA

JOB NO: 404 Complete
CUSTOMER: Cooke

KEYPUNCH CODE
ANALYST

A. BOWES & ASSOCIATES
P. O. BOX 160, Steamboat Spgs.
Colorado 80477

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH
Fe, Mg, Ca, Ti, Na, K, Si & AL reported in %, all other elements reported in PPM Appendix A-5

DATE 5-10-7[illegible]

Date No.	Office No.	Field No.	Au	Ag	Cu	Pb	Zn	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	Na	K	Si	Al	P
0	Reference	7080	1/	30																																	
1	27144	Crw-3	1/	1.0																																	
2	27145	4	1/	3.0																																	
3	27146	5	1/	7																																	
4	27147	7	10	G 20%																																	
5	27148	8	10	20%																																	
6	27149	10	1/	50																																	
7	27150	11	1/	30																																	
8	27151	13	1/	L																																	
9	27152	14	1/	5																																	
10	27153	15	10	1.5																																	
11		—	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	Lower Detection Limit		10	0.5	5	10	200	5	0.05%	50	5	10	20	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.05	0.02%	.001%	0.2%	0.5%	1%	0.5%

N - Not detected L - Detected, but below limit of determination G - Greater than value shown

REMARKS Au - Ag only.
Sorry

JOB NO: 404
CUSTOMER: H.R. Cooke

KEYPUNCH CODE
ANALYST [illegible]

Appendix A-5

Appendix IA-3

W.M. BOWES & ASSO. Brown Lab Fire assays
P O Box 150, Steamboat Spgs. Bowes spec ppm
Colorado 80477

SE. QUANTITATIVE SPECTROGRAPHIC ANALYSIS

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH

Fe, Mg, Ca, & Ti reported in %, all other elements reported in ppm Appendix IA-3

FILM NO. S-11[illegible]

DATE Feb 11,

Plate No.	Office No.	Field No.	Au	Ag	Cu	~~Pb~~	~~Zn~~	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	H
1	Reference		oz.			Au	Ag																										
2	27138	CRW-1				N	L																									>.05
3	27139	CRW-2	.005	2.8		N	70																									1.0
4	27144	CRW-3	.01	3.6																												0.3
5	27145	CRW-4	.03	6.7																												0.9
6	27146	CRW-5	N	.22																												0.1
7	27140	CRW-6	.1	4.4		N	50																									1.1
8	27147	CRW-7	.21	41.3																												10
9	27148	CRW-8	.18	28.5																												7.3
10	27141	CRW-9				N	1																									0.0
11	27149	CRW-10																														0.3
12	27150	CRW-11																														0.1
13	27142	CRW-12				N	N																									0.0
14	27151	CRW-13																														7.0
15	27152	CRW-14																														0.0
16	27153	CRW-15	.29	12.7																												15.6
17	27143	CRW-16				N	7																									0.07
18																																
19																																
20																																
21																																
22																																
23																																
24																																
Lower Detection Limit →			10	0.5	5	10	200	5	0.05%	50	5	5	5	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.05%	0.02%	0.01%	.05

N = Not detected. L = Detected, but below limit of determination. G = Greater than value shown.

REMARKS: AA gold Job 404

CODED BY _____

ANALYST Asm

5420 0014
(2 of 2)

(21)
~~Factory~~
Copy for Sale

Item 14
2 of 2

WONDER SILVER-GOLD MINING DISTRICT

Churchill County, Nevada

June 5, 1973

COOKE, EVERETT & ASSOCIATES, INC.
CONSULTING GEOLOGISTS

421 COURT STREET
THIRD FLOOR

P. O. BOX 2092
RENO, NEVADA 89505, U.S.A.

TELEPHONE (702) 323-6254

WONDER SILVER-GOLD MINING DISTRICT

Churchill County, Nevada

SUMMARY

The Wonder district, especially the Nevada Wonder mine, offers an outstanding opportunity for mining investment, which should become still more attractive with the probable continuing rise in the prices of gold and silver. It is located in north-central Nevada, one of the few environmentally relaxed areas for mining left in the U.S. It has good access roads, water supply, millsite, and year-around working climate. It made a large and very profitable production when gold and silver prices were less than one-fifth their present levels.

A program to reopen the Nevada Wonder mine is proposed here, at an estimated cost of $750,000. Estimated profits from possible ore are at least $23,700,000 during about 12 years of mine life. The high priority target is the bottom half of the enriched section of the Nevada Wonder ore shoot, which for unknown reasons was left largely unmined. Several other ore targets should also be commercial, and also will be tested.

The Wonder district produced about $6 million in silver and gold, and paid $1.5 million in dividends from 400,000 tons of ore processed in a 200-ton/day cyanide mill during 1911-19. Average grade was about 0.18 oz gold and 18 oz silver, with 93% mill recovery. At present prices ($100/oz gold, $2.50/oz silver), the

value of this production would be $7 million in gold and $17.5 million in silver, or $24.5 million total.

Production came nearly all from the Wonder vein zone, a very strong northwest-striking structure dipping steeply northeast and reaching up to several score feet in thickness. The hanging (east) wall of this zone is formed by the Wonder fault with 30-50 ft of breccia and gouge; a few feet west is the Nevada Wonder vein, much the strongest and richest of the several subparallel veins forming this structure. The principal underground workings, on the Nevada Wonder vein, are now inaccessible because both the Nevada Wonder and Extension shafts are impassable near the surface. However, old production records show that the Nevada Wonder vein with its extensions southeast and northwest, the Extension and Hidden Treasure veins, was mined for 3400 feet laterally and 1300 feet vertically by 8 miles of underground workings. The main Nevada Wonder 3-compartment shaft was sunk to the 1300 L, where the silver enrichment bottomed; 1800 ft southwest, the Extension shaft system was sunk to the 2000 L, the bottom exploration. Nearly all production came from the enriched ore above the 1300 L; the 500-700 L was especially rich. The stope maps delineate two main ore shoots: the Nevada Wonder, stoped to the 700 L, and the Extension, stoped to the 1300 L. Both ore shoots rake steeply northwest.

There is considerable possible ore in several categories, but the principal reserves now apparently are in the Nevada Wonder mine, with an estimated recoverable value of $23,700,000. On present information, such an estimate really is only a guestimate, necessarily involving assumptions about many important variables, such as grade, tonnage, operating costs, and prices of gold and silver. Much of the estimate of possible ore and the proposed program may be changed by feedback information, once testing is begun. Nonetheless, it seems preferable to try to quantify these factors, exploring their derivation and uncertainties, rather than to wait for more reliable data - which might never come unless such present

guestimates are hazarded and tested. Reopening the Nevada Wonder mine is proposed in two stages: Stage 1, underground and surface sampling, costing an estimated $70,000 and taking about 4 months; then, if results are favorable, Stage 2, mine and mill plant installation, costing an estimated $680,000 and taking about a year.

In Stage 1, a pipeline would be laid to deliver water to the mine. The main Nevada Wonder ore shoot would be entered on the 600 L from the Hidden Treasure shaft and sampled in various levels and stopes. Other possible ore, such as near-surface open-cutting ground, would also be sampled, as well as the old dumps and tailings. Milling tests would be made on all ore types. Studies, probably computer-based, would be made to determine the mining and milling methods which would maximize profits.

In Stage 2, a ramp for trackless load-haul-dump vehicles would be run from near the Hidden Treasure shaft, at -30° gradient, to intersect the Nevada Wonder ore shoot below old stoping. A 300-ton/day flotation mill would be built near the portal of the ramp. This should be onstream within about 1-1/2 years from the commencement of the proposed program.

INTRODUCTION

I visited the Wonder district with Claude B. Lovestedt in April, 1972. No important mining had been done for many years, and the main Nevada Wonder shaft and workings had become inaccessible. The information herein therefore, is based mainly on surface examination, earlier reports - principally F. C. Schrader's, and talks with C. B. Lovestedt.

The location, topography, some local geology, claims, mine-workings, and sampling are shown on attached maps 269AF, 269BF, 269CF, 269DF and 269EF. The old workings and claims are shown on detailed maps owned by Frank W. Lewis, as follows:

Nevada Wonder

Claim map (Jovestedt lease)	1 in/500 ft
Wonder claims	1 in/300 ft
Nevada Wonder mine, plan	1 in/100 ft
Nevada Wonder mine, longitudinal section	1 in/100 ft

Assay certificates of our recent sampling are attached in Appendix I, and production records are shown in Appendix II.

LOCATION

The Wonder district is in Churchill Co., Nevada, at 5,000-6,000 ft altitude, on the east flank of the Louderback Mtns. and on the west flank of the Augusta Rg., an offshoot of the Clan Alpine Mtns. It lies mainly in T.19N, R.34E, Sec. 33 and T.19N, R.35E, Sec. 31, M.D.B.&M. Local relief is moderate, incised by steep-sided dry-washes, draining N then W to Dixie Valley.

Nearby timber and water is lacking. Water for the Wonder mines came from Horse Creek in the Clan Alpine Mtns., 6.5 miles N, flowing 60 ft^3/min by gravity with an inverted siphon across the Augusta Rg. Water for the town of Wonder came from Bench Creek, 6.5 miles ENE, flowing 180 ft^3/min, by gravity flow.

No power line passes near Wonder. The U.S. Navy is understood to have proposed a line from Fallon to their bombing range near Frenchman Flat, which would pass 10 miles from Wonder. If built, it might supply power for Wonder.

Winters are cold, with some snow; summers are warm and dry except for occasional thunderstorms and flash floods. Vegetation is sparse, mainly sagebrush and other desert plants. Roads generally are open all year except for a few days of winter snows. Mining regularly was done year-around.

Wonder is reached from Fallon, the nearest large town, by driving E on US Highway 50 for 40 miles, then turning left NNE for 1 mile on the Dixie Valley graded road, then turning right NE for 13 miles on good dirt road to the old town of Wonder.

PROPERTY

The subject property consists of one placer claim and 28 patented claims, as follows:

	Survey No.		Survey No.
T-I Placer		Golden Dawn No. 1	3611
Nevada Wonder	3078	Golden Dawn No. 2	3611
" " No. 2	3325	Golden Dawn No. 3	3671
" " No. 3	4225	" " No. 6	3671
Hidden Treasure	4226	Queen No. 5	3786
Ruby No. 1	3071	" No. 8	3786
" No. 2	3327	Scorpion Lode	3071
Great Eastern	3122	B & S Lode	3072
" " Fraction		Novadan	3398
" " No. 1	3122	Little Witch	3398
" " No. 3	3122	Silver Tip	3398
" " No. 4 (title poor)"		Valley View	3398
Last Chance No. 1	3124	Pan Handle	3398
SE 1/2 Last Chance No. 2	3326	Yellow Jacket	3398
		North Star Lode	4227

These claims comprise most of the important mining ground in the old Wonder district, including 200,000 tons of old mill tailings 1/2 mile W of the town of Wonder on the T-1 placer claim. The property is owned by Frank W. Lewis, of Reno, and is under lease to Claude B. Lovestedt, of Carson City; the lease runs for 30 years from the date of execution, November 1971, with 6% royalty on net proceeds and $300/month minimum payment, all payments applying on a $1,500,000 end price. It is available for inspection.

The 200,000-ton tailings pond 5 miles NW of Wonder is owned by J. R. Keighley, of Reno.

Water rights to Bench and Horse Creeks are held as follows:

Bench Creek	7764	Dangberg	0.257 ft^3/sec
	303	Wonder Water Co.	5.0
Horse Creek	9428	Reynolds	1.084 ft^3/sec
	1510	Nevada Wonder Mining Co. mining & domestic use	0.28
	0754	Nevada Wonder Mining Co. irrigation	--(not specified)

The Lovestedt lease carries the rights to No. 1510 and 0754, or to 0.28 ft^3/sec water, plus an unspecified additional amount for irrigation.

HISTORY

The Wonder district was discovered by Tom L. Stroud in 1906. In November 1906, the Nevada Wonder Mining Co. was formed, mainly by Eastern capital, and production begun. Mining was by open-cutting and underground shrinkage stoping. In 1911 a 200-ton, 10-stamp cyanide mill was built which worked till 1919, producing about $6 million, with 93% recovery, and paying $1,549,005.45 in dividends from some 400,000 tons of ore. The receipts for silver were about three times those for gold. In 1914, 1916 and 1918 small payments were received for copper and lead, both at grades under 0.1%, in concentrates sent to smelters, totalling 5,900 lbs Cu, sold for $1,453, and 4,064 lbs Pb, sold for $276. In 1940, 1284 lbs of Cu were recovered from 756 tons of ore smelted, a grade of 0.085% Cu. Production records now available are included in Appendix II and summarized in Table 1.

Table 1

Summary of production, Wonder district

		Recovered values		Average grade, oz/ton				
				Recovered .93 rcvry		Heads		
Date	Wet short tons	Au, oz.	Ag, oz.	Au	Ag	Au	Ag	Notes
1907-19	393,091	66,264.03	6,051,805	.169	17.4	.181	18.6	Mainly 1911-19, NV Wonder cyanide mill (private report, author?)
1920-42	20,148	5,333.36	354,004	.265	17.6	.283	18.8	Mainly 1938-42 (private report, author?)
1907-42	413,239	71,597.39	7,205,809	.173	17.4	.185	18.6	
1907-37	398,355	69,340.11	6,524,150	.176	16.4	.188	17.5	(Merrill, USBS IC 7093)

At present prices,[1] gold about $100/oz and silver $2.50/oz, the average grade of recorded heads, .185 oz gold and 18.6 oz silver, would be worth $18.50/ton in gold and $46.50/ton in silver, or $65/ton gross metal value.

During the last two years of milling, 1918-19, average grade had dropped to 0.118 oz Au and 11.87 oz Ag, apparently because of a decreasing ratio of enriched Ag ore to the deeper primary sulfide ore. However, the small production by lessees during 1940-42, shipped to outside mills or direct to smelter, ran much higher Au, 0.283 oz/ton, though Ag tenor was the same, 18.8 oz/ton. This may reflect two factors: (1) hand sorting to up-grade the ore shipments, and (2) depletion of the rich silver ore.

The total production of Wonder would have a present market value of about $7 million in gold and $17.5 million in silver, or $24.5 million total. These figures are all minima; much production surely was unrecorded due to incomplete or lost records. High-grading would have removed the best ore, and so lowered recorded grades, as well as recorded production.

Power was brought in by a 150-mile transmission line from Bishop, CA, said to be the longest then in the nation. Water was piped in from Bench and Horse Creeks. The sudden shutdown of the mill in 1919, with no effort to sustain milling by continuing leasing, is hard to understand, particularly when the bottom half of the enriched portion of the Nevada Wonder ore shoot was left essentially unmined, from the 700-1300 L. Presumably the mill shut down due to depletion of available enriched silver ore, but this should have been more than compensated by the rise in silver price: during 1918-1919, grades of ore mined had dropped off about a third in silver and gold from grades during earlier mining, but the price of silver had nearly doubled. In fact, the 1919 silver price, $1.11/oz,

[1] "present prices" in this report are taken at $100/oz Au and $2.50/oz Ag. Both gold and silver prices are now higher and probably will continue to increase rather than decrease; these figures are considered conservative.

not only was the highest to that date, but was to be the highest for over four decades to come.

In 1920, after the mill shutdown, some mining continued, shipping ore direct to smelters with a credited content of 517.57 oz Au and 14,505 oz Ag. Other small smelter shipments were made in several other years during the 1920's. In 1924-1925, Lewis E. Curtis of Reno acquired the NV Wonder; the mill was razed and the machinery sold, and the power transmission line to Bishop was removed. During the 1920's the Jackpot shaft burned, and during the 1930's the Extension shaft burned, both possibly due to spontaneous combustion. In 1931 a lease was taken up by a Tonopah operator. The Nevada Wonder shaft was found to badly need timbering. This was commenced, but discontinued for lack of funds after reaching the 200 L. However, mill and smelter shipments were made totalling about 400 tons, averaging 0.59 oz Au and 33.0 oz Ag per ton. Flotation tests made on near-surface ore by International Smelting Co. gave Au recovery of 91% and Ag 85%.

The Nevada Wonder tailings pond was reported to have been sampled in 1930 by Ernie Gray of Reno at $0.75/ton Au + Ag. During the 1930's and early 1940's, Curtis leased the NV Wonder to various local operators who made small ore shipments to outside mills or direct to smelters. Besides Au and Ag, a little byproduct Cu and Pb was recovered in the smelter, but in amounts indicating grades of less than 0.1%.

Claude Lovestedt said that during 1937-40, the Shaw brothers mined at the S end of the Nevada Wonder workings, and during the same years Jensen mined, mainly on the 400 L and 700-800 L. During 1937-42, McAdam and sons produced some ore. Lovestedt said he had been told by these miners that the Nevada Wonder shaft was caved from the surface to the 70 L, so a bulkhead was placed there, and the vein open-cut to the 200 L. About 25,000 tons was reportedly trucked about 27 miles to the Middlegate mill on US Highway 50.

A cave-in during 1940 stopped work here; the ore was said to be low-grade-- only about $13/ton (at $35/oz Au, $0.40 Ag). Iovestedt said that Stewart renovated the Nevada Wonder shaft, and that Shaw reported the S end of the Nevada Wonder vein was open to the 200 L in the 1930's, and may still be open.

On June 30, 1942, the Wonder mines were shut down by war-time Federal Order L-208. Reportedly, they were subsequently abandoned for taxes. Frank W. Lewis, of Reno, acquired the Nevada Wonder property in the early 1960's, and is the present owner. In November 1971, a 30-year lease was granted to Claude B. Iovestedt. He reported that during the summer of 1972 a fire broke out in the Nevada Wonder shaft, apparently due to vandalism or spontaneous combustion. It probably had already been damaged by earthquakes.

The Wonder vein was explored vertically to 2,000 ft depth, and worked on 13 levels with 3,400 ft of lateral development - in all, over 8 miles of underground workings. The 3-compartment Nevada Wonder shaft was sunk to the 1300 L, but the main stoping from it bottomed at the 700 L. The Extension shaft system, 1,300 ft S of the Nevada Wonder shaft, was sunk to the 2000 L, connecting with the Nevada Wonder shaft and exploring the vein below it. The Extension shaft itself reached only to the 750 L then continued down to the 2000 L via 4 step-off shafts (sub-shafts). Stoping from this shaft system largely bottomed at the 1300 L.

The Nevada Wonder mill, between the Nevada Wonder and Extension shafts, had its tailings pond about 1/2 mile W of the town of Wonder, where some 200,000 tons of tailings remain. About 5 miles NW of the town of Wonder is another tailings pond, containing about 200,000 tons of slime tails. These tailings probably did not come 5 miles from the Nevada Wonder mill, but from another, nearer mill, now removed.

Other mining was done for several miles NW of the Nevada Wonder as indicated by the claims on Map 269 BF:

Jackpot mine - 1.2 miles NNW, 850 ft below the Nevada Wonder shaft collar, sunk to 950 depth, 6,000 ft of workings on four WNW-striking, NE-dipping veins.

Vulture mine - NW of Jackpot, 600-ft adit and 200-ft shaft.

Hercules mine - 4 miles NW of NV Wonder shaft

Jensen shaft & adit - several miles W of Wonder, reported by Lovestedt to have mined 60-ox silver and 10% Cu ore in a 6-inch vein.

Great Eastern district - some 7 miles NW of the Wonder shaft, several small adits, shafts & open-cuts on small high-grade veins.

Small mines and prospects - over a dozen mentioned, principally in Schrader's report.

The Wonder district has been described in many private and published reports, including the following:

Burgess, J.A. - 1913 - Halogen salts of silver at Wonder, Nevada - Econ. Geol. 12, 589-93.

Carpenter, E.E. - ____? - Cyaniding practise of Churchill Milling Co., Wonder, Nevada - Trans. Amer. Inst. Min. & Met. Eng. LII, pp. 123-137.

Davie, Robt. G. - 1910 - Private report.

Lincoln, F.C. - 1923 - Mining Districts and Mineral Resources of Nevada.

Merrill, C.W. - _____? - U.S. Bur. Mines, Information Circular 7093.

Negraw, H.A. - 1913 April 5 - Cyaniding at the Nevada Wonder mills - Eng. & Min. Journ. XCV, 14 693-5.

Paher, S. - 1970 - Nevada Ghost Towns and Mining Camps.

Schrader, F.C. - ____? - Carson Sink area, Nevada (Wonder district).

Smither, T.M. - 1915 May 15 - Stoping methods of the Nevada Wonder mine - Min. & Sci. Press, 757-9.

_____? - 1928 Feb 14 - Min. & Eng. World, p. 432.

_____? - 1936 Jan 2 - The Nevada Wonder mine (private report; maybe by owner at that time, Louis F. Curtis?).

GEOLOGY AND ORE DEPOSITS

Geology

Schrader described the country rock as Tertiary volcanics,

divided as follows:

Late Tertiary	Basalt flows
	Au-Ag ore deposition
	Andesite
	Extension rhyolite
	Dickey Pk. rhyolite
Middle or early Tertiary	Alpine dacite
	Wonder rhyolite - oldest and most abundant flow, 2,000+ ft thick, main country rock for Au-Ag deposits.

The volcanics are intensely fractured by several fault systems (Schrader), as follows:

Nevada Wonder vein system - NW-striking, steeply NE-dipping, main Au-Ag producer.

N-striking normal faults - strong alteration & mineralization, tilt fault blocks up to E. Kaolinization in four NS belts along topographic gaps probably along such faults.

E-striking alteration zones - in center of Wonder district, probably on faults.

Fault-controlled valleys - many, such as the N-running Hercules Canyon.

Cross-jointing - post-mineral, N290°, dip steeply N.

Block faulting - intermittently active to present time on Dixie Valley & other N-trending faults; earthquakes and scarps in 1906, 1915, 1954; one recent fault scarp passes about 2 miles E of Wonder.

WNW-striking tear fault? - apparently passes just N of Wonder district as seen on ERTS photos; possibly 5+ miles of dextral displacement?

Ore Deposits

Over 50 veins are reported in the Wonder district by Schrader, mainly in the Wonder rhyolite, all highly siliceous, with quartz-adularia gangue, and values in Ag-Au. The district's silver-gold production nearly all came from mineralization in the Wonder rhyolite, and principally from the Nevada Wonder vein. This vein is the NEmost and principal member of the strong NW-striking Wonder vein zone, in which several other veins occur across a width of up

to several score feet. This zone, or branches from it, continues NWward at least for several miles in the Jackpot, Hercules, and Great Eastern mines. Eastward 40 ft from the Nevada Wonder vein is the Wonder fault, a 30 to 50-ft wide crush and gouge zone. The whole Wonder vein and fault system thus appears to represent one major NW-striking fracture zone, dipping steeply NE. Many footwall branch or cross veins occur, but none were reported in the hanging wall. The principal veins mined in the Wonder vein system are:

N 25 W

Nevada Wonder vein - strikes N25°W, dips 75°NE, worked for 3,400 ft laterally, 2,000 ft vertically, up to 40 ft thick.

Badger vein - parallels NV Wonder vein a few feet to SW, but narrower and lower grade.

White No. 1 vein - blind N spurs of Extension vein, with much white quartz.

White No. 2 vein - same

Extension vein - S extension of NV Wonder vein

Hidden Treasure vein - N extension of NV Wonder vein, 60-ft wide crush zone worked to 300 ft depth.

North Star vein - N of Hidden Treasure vein.

Footwall EW or branch veins - one 6-ft branch of the NV Wonder vein ran 26 oz Ag with Pb and Zn values; many small (less than 0.5 ft thick) high-grade veins (0.15 oz/ton Au, 70 oz Ag).

The veins are epithermal. The main gangue is quartz and adularia, and local reddish fluorite. The quartz-adularia is partly pseudomorphous after spar minerals (calcite, barite or fluorite), and often is banded, sheared, brecciated or crushed. Recovered values were nearly entirely in Au and Ag, with occasional byproduct Cu and Pb, apparently in grades below 0.1%. Schrader cites a Au/Ag ratio of 1/40 (by weight?), and a seemingly contradictory ratio of 1/5.3 (1.5/8), by volume. These ratios disagree with the production data, which show a Au/Ag ratio by weight very close to 1/100.

The principal ore minerals are gold, argentite, cerargyrite and halogen salts; the Wonder district was noted for its silver

chlorides and bromides (Burgess, 1913). A little local Cu, Pb and Zn was reported. Over 40 ore minerals, mostly secondary, are described by Schrader. The ore, however, was clean, and free milling. The vein outcrops often form prominent ledges due to their erosion-resistant siliceous gangue, carrying Fe-Mn oxide gossans with Ag salts. The main primary ore minerals are gold, argentite, chalcopyrite, galena, sphalerite, and molybdenite, along with considerable pyrite. Mineralization apparently occurred in late Miocene or Pliocene time, since volcanics of probable middle Tertiary age are mineralized, but the late Tertiary basalt is unmineralized.

Production was almost all confined to the oxidized and enriched zone, which bottomed sharply at about 1300 ft depth, probably marking an old ground water level. In the sulfide zone below, pyrite increased in amount, and quartz and gold decreased. The best values were reportedly on the hanging wall, between the 500 and 700 L., possibly marking another ancient water table. Production from the 700-1300 L was relatively small. The mine was dry to the bottom, at 2000 ft, and cool - about 86°F.

Notwithstanding the thick Wonder vein zone, the NV Wonder vein seems to have been stoped on average only across a 5-ft width:

stoped area (map 269DF) = about 1 million ft^2,
for stope width 5 ft, volume = 5 million ft^3,
with s.g. 2.6, or about 160 lbs/ft^3, wt = about 800 million lbs
= 400,000 tons, the recorded production

However, the actual stope-width no doubt varied from 2 or 3 ft to much more than 5 ft.

The maps owned by Frank Lewis of the underground workings of the Nevada Wonder mine show stoping on two principal ore shoots: the Extension and the Nevada Wonder. Both rake steeply N. The Extension is narrower, but was stoped deeper, to the 1300 L, whereas most stoping on the Nevada Wonder ore shoot was above the 700 L. Possible ore has been demarcated in many places on the longitudinal stope maps, perhaps based on data now unavailable (map 269DF).

Some information on grades was reported by Claude Lovestedt, who was able to enter the main NV Wonder shaft to muck just above the 200 L. He reported getting up to 3 oz Ag from 6 or 8 samples of unselected fines in the open-cut stopes between the NV Wonder shaft and Extension. A sample he took on the 70 L of 30 inches of vein quartz ran $30/ton at 1970 prices (Appendix I, B-1, No. 3). The Shaw brothers reported they found $15 ore on the 200 L (prices at $35/oz Au and about $0.40/oz Ag). Lovestedt said he took two samples on the 200 L, N and W of the main shaft, across a 6-ft back: one at the portal ran 0.06 oz Au and 10 oz Ag, and one 100 ft in the drift ran 0.06 oz Au and 7 oz Ag. A sample from 1000+ tons of muck in a 200 L stope S of the NV Wonder shaft ran 0.03 oz Au, 4.60 oz Ag; a sample of 3000-4000 tons of muck in a 200 L stope N of the NV Wonder shaft and access manway ran 0.05 oz Au, 2.99 oz Ag (Appendix I, B-1, Nos. 1 & 2). The longitudinal stope map has an added ink note indicating 18 inches of 300-oz Ag ore in the Extension ore shoot, between the 1000 and 1150 L, and going on deeper.

The deeper main workings of the Nevada Wonder mine were inaccessible in 1972, so our sampling was done on the surface or in open-cuts or shallow workings. Sampling across 66 ft of the NV Wonder and Badger veins near the NV Wonder main shaft showed less than 0.1 oz Au, and 2.8 - 6.7 oz Ag. The 26-ft horse (CRW5) ran surprisingly low: Au nil, Ag 0.22 oz, considering its very brecciated and mineralized appearance. The low grades found were expectable in the wall of an open-cut left unmined for 67 years beside the main NV Wonder shaft. Also, considerable surface oxidation and leaching of Ag values is likely. Two samples of high-grade selected by Lovestedt ran well in both Au and Ag: CRW7 - Au 0.21 oz, Ag 41.3 oz; CRW8 - Au 0.18 oz, Ag 28.5 oz.

Sampling in the Hercules and Great Eastern areas, CRW10-16, showed low values except for CRW15, ore selected by Lovestedt from near a 60-ft shaft and 80-ft tunnel: Au 0.29 oz, Ag 12.7 oz.

In 1971, Lovestedt sampled the dump on the N side of the

NV Wonder shaft. He took 5-lb samples from the bottoms of 28 2-ft holes spaced on a 20-ft grid. They averaged 0.0087 oz Au and 0.81 oz Ag; at present prices, $0.87 Au and $2.02 Ag, totalling $2.89, or with .85 recovery, $2.46/ton (Appendix I, B-2 &3).

In 1930, when the gold price was $20.67 and silver was $0.30/oz, the tailings pond was reported to have been sampled by Ernie Cray, of Reno, at $0.75/ton Au +Ag. This pond presumably is the one 1/2 mile W of Wonder, reported to contain 200,000 tons. Assuming Au/Ag::1/100, as in the heads, the tailings would run about .014 oz Au and 1.4 oz silver. At $100/oz Au and $2,50/oz Ag this would be $4.90/ton. At 85% recovery this would yield $4.16 values, but recovery of tailings is likely to be less. Lovestedt sampled this tailings pond at 2 oz/ton Ag.

CONCLUSIONS AND RECOMMENDATIONS

Recorded production from the Wonder district is about 70,000 oz gold, with mill heads averaging about 0.18 oz/ton, and 7 million oz silver, averaging about 18 oz/ton, from about 400,000 tons of ore. Considerably more production probably is unrecorded, especially of high-grade.

Faulting, on several fracture or vein systems, has been even more severe than in most Nevada mining districts. The Nevada Wonder vein zone itself follows a strong NW-striking fracture, the Wonder fault, which may have been opened up by renewed tensional stress from dextral movement on an old regional WNW-striking fault north of the Wonder district. Normal block faulting is still continuing in the district, expressed in several historical earthquakes and scarps.

With recent great increases in the prices of gold and silver, the possibility of reopening the Wonder district has become attractive. The unmined bottom half of the NV Wonder ore shoot, in the enriched zone, 700-1300 L, is the prime target. Estimates of present operating costs must be made with few guidelines, as

nearly four decades of frozen gold price has left few operating gold mines in the United States, albeit this situation may be considerably changed within a few months. Also, the condition of the underground workings, which will greatly influence mining costs, is largely unknown. They can be assumed to be dry, but may be considerably damaged by fires, earthquakes or cave-ins. Most important future mining very probably will be underground, since most of the open-cutting ore has been mined. Several men who mined in the NV Wonder after the mill shut down are still alive and have been contacted by Lovestedt, including the Shaw brothers, Jensen, and McAdan, of Fallon, and Bottomley of Lovelock. They probably could supply much additional information about the now inaccessible workings and last production records.

Some operating cost guidelines and estimates are listed following, including my present estimates for Wonder.

Table 2

Operating costs and estimates, dollars

	Homestake estimated, active, 1972	Vanderbilt estimated, inactive, 1971		Wonder, 1973, estimated costs			
		HMT[a]	CEA[b]	CBL[c]	above 1300 L CEA[b]	1300–2000 L CEA[b]	below 2000 L CEA[b]
Mining		3.50	7.50	7.00	7.00	9.00	11.00
Milling		3.50	3.50	3.50	3.50	3.50	3.50
Overhead & Misc.			2.00		2.00	2.00	2.00
Total	10–11±	7.00	13.00	10.50	12.50	14.50	16.50

a - Heavy Metals Technology b - C. B. Lovestedt c - Cooke, Everett & Assoc.

The potential for important ore bodies in the Wonder district warrants serious testing. This would begin with sampling the surface and underground ore - Stage 1; if favorable, then installation of mining and milling facilities - Stage 2.

Stage 1 - examination and sampling: Outcrops and old open-cut exposures can readily be systematically sampled to outline any open-cutting grade ore. However, the only satisfactory way of sampling

the veins and appraising the old underground workings is by reopening and entering them. Drilling would run into problems with old workings and fill, and poor recovery on faults. The Nevada Wonder shaft is now inaccessible, and its rehabilitation would require a major outlay. The condition of the Extension shaft is uncertain, but probably poor since the fire in the 1930's. However, the Hidden Treasure shaft is believed to be in good shape and, as suggested by Lovestedt, should afford the best entry into the old workings. This would be done by opening up the Hidden Treasure shaft and 600 L to enter the workings at this level and below in the NV Wonder ore shoot. These levels then probably could be explored and sampled, using manways left open when mining stopped. Tailings and dumps should be systematically sampled. Mill tests should be made on bulk samples of representative types of surface and underground oxidized and sulfide ores, as well as of tailings and dumps. Water for mining could be obtained from Horse Creek by laying a 6.5-mile pipeline. The Lovestedt leasehold water rights on Horse Creek are for 0.28 ft^3/sec, or 110 gal/min, plus an unspecified additional amount. If needed for milling, much more water probably could be obtained by buying into the Wonder Water Co., which has rights on Bench Creek to 5 ft^3/sec, or 2,244 gal/min. Sufficient water for milling probably could also be developed in Dixie Valley, or in West Gate Wash, some 10 miles S, near US Highway 50.

The pipeline to Horse Creek would be new steel, and probably end up as 2-in diameter, but be possibly larger sizes near the intake. Several miles of it probably could be buried, permitting use of cheaper plastic pipe, costing about $0.16/ft. Its total cost, including inlet, is estimated at about $0.50/ft , or $17,000 for 6.5 miles.

Costs of Stage 1 are estimated as follows:

$20,000	pipeline and pumps, 2 in±, 6.5 miles, Horse Creek
50,000	rehabilitating Hidden Treasure shaft & workings, sampling, mill and feasibility tests
$70,000	

Stage 2 - preparation for mining and milling: Contingent on favorable sampling results from Stage 1, Stage 2 would start with preparatory mining. This probably could best be done by Load-Haul-Dump vehicles using a -30° maximum ramp-grade decline about 1600 ft long, collaring near the Hercules shaft, cutting the main Nevada Wonder ore shoot near the 1000 L, and reaching the 1300 L (map 269DF). This would give 600 ft of backs below the bottom of the major old stoping. LHD ramp hauling now is often preferred to the older shaft and level method because it obviates much equipment and labor in shafts, hoists, rails, and trains, and so may be cheaper both to install and to operate. Several take-off levels probably would be run into the Nevada Wonder ore shoot. The cost of a LHD ramp is estimated at $65/ft, or about $100,000 for 1,600 feet. The cost of take-off levels, exploratory raises and other work preparatory for stoping is estimated at another $100,000. The ore would be mined by shrinkage stoping, using cut-and-fill when necessary.

The proposed millsite is in the valley just N of the Hidden Treasure shaft (map 269BF). The type and size of mill would depend on milling tests made in Stage 1. Provisionally, however, a flotation mill is proposed. A cyanide mill probably would give better recovery, especially on the oxidized ores; average cyanide recovery during production was 93%. However, flotation would be cheaper to install, possibly about half the cost, and should also give good recovery; flotation tests in 1931 gave 91% Au and 85% Ag recovery; and recovery should improve on the deeper sulfide ores which will constitute the main mill feed. Cyanide control is trickier than flotation and requires experienced cyanide men - who have become very scarce. Also, copper is a cyanicide, and is likely to increase in the deeper ores. Flotation, therefore, is recommended pending results of the milling and feasibility tests of Stage 1. The flotation concentrate would be sent to the smelter, and the tails could be recycled into a small cyanide circuit for Au-Ag-Cu extraction.

The recommendation of flotation milling assumes that a reasonably nearby smelter will be operating, as Anaconda's East Helena smelter. If environmental pressures should cause the closing of all available smelters, a cyanide mill would necessarily be the choice.

Good second-hand milling equipment now is available much cheaper than at new prices. A second-hand flotation mill might cost $1000 per ton/day capacity, whereas a cyanide mill might cost at least double this. The size of the mill chosen would depend partly on what good used equipment is found. The sampling and milling tests in Stage 1 would be important guides. Costs per ton decrease and present value of future profits increases considerably with increasing size of mill and production, but capital costs of installing a mill increase approximately linearly with increasing size. Ideally, a computer study would optimize these and some other factors, such as projected costs and prices, to determine the size and type of mill and mining to maximize the present value of expected future profits. Provisionally, a mill of around 300 tons/day capacity should strike a good balance between these factors. At $1000 per ton/day capacity it would cost $300,000. It should be set up so that additional units could be later added for increased capacity, or for a cyanide circuit. A 300-ton flotation mill probably would need 100-150 gal/min of water. The Lovestedt lease carries water rights to 110 gal/min from Horse Creek. If more water is needed it should be available from the sources previously mentioned.

Although a power line passing 10 miles from Wonder may be built soon by the Navy, no nearby power line now exists. Unless the Navy power line is built and available, the mill and camp must be run by diesel power, which could be supplied by two 500-kw Caterpillar diesel engines.

The costs of Stage 2 are estimated as follows:

$200,000	Ramp 1600 ft long and ancillary workings
300,000	Flotation mill, 300 tons/day, with 1000-kw diesel generators
180,000	Underground development, rehabilitation, sampling, tests, possible additional water pipeline, camp construction, roads, office, overhead
$680,000	

The total cost of Stage 1 and Stage 2 would be $750,000. Once the initial $70,000 is committed, testing of Stage 1 could be completed within several months; if this is favorable, installation of the operating plant of Stage 2 should not take over a year, so the mill could be onstream and producing by late 1974.

The principal possibilities for more ore in the Wonder district appear to be the following:

A) Open-cut ore: Some tonnage of open-cutting grade ore probably can be found now that gold and silver prices have increased five-fold, and open-cutting methods are much more efficient than in the old mining. Lovestedt found up to 3 oz Ag/ton in the open-cuts between the NV Wonder and Extension shafts. Silver values may be partly leached, but gold should remain in or near outcrops. Systematic sampling for such ore during Stage 1 investigations may delineate a considerable tonnage of open-cutting ore, but no estimate of grade or tonnage is worthwhile on present data.

B) Nevada Wonder shaft, 700-1300 L: This is the prime ore target. Presumably, it still is in the enriched zone which bottomed at the 1300 L, as described by Schrader and others. Significant stoping from the Extension shaft reached the 1300 L, but stoping from the NV Wonder shaft reached only the 700 L. The tenor of this ore shoot from the 700 to 1300 L should be comparable with that already mined in the Extension ore shoot between these levels. The old stope map shows several notations of "ORE" in Block B ground, and one notation "SULPHIDE ORE" just above the 1300 L.

The reason for apparently leaving the bottom half of the Nevada Wonder ore shoot unmined is unknown. Possibly, relatively low grade ore encountered in sinking below the 700 L was discouraging; Schrader reported that the richest levels were the 500-700 L. In any case, with gold and silver prices now over five times higher, the downward extension of the Nevada Wonder ore shoot is an outstanding target.

The ore should run about the same as the average of old production, 0.18 oz/ton Au and 18 oz/ton Ag, or $63/ton at present prices. Milling recovery of 85% would leave $53/ton recoverable values. With $12.50/ton operating costs (Table 2), operating profit would be $40.50/ton. The stope map shows this block to be about half the area of old stoping, so half the 400,000 tons produced is estimated - 200,000 tons. At $40.50/ton operating profit this would make $8,100,000 total operating profit.

C) Nevada Wonder and Extension ore shoots, 1300-2000 L: The NV Wonder vein zone is proven to extend at least to the 2000 L by exploration on the Extension shaft system. The deeper ground was then uneconomic, presumably because of lower Ag grades below the bottom of enrichment at the 1300 L. Schrader reported that Au grade decreased in the sulfide zone, but, nonetheless, the general gold tenor should hold up there, as well as primary silver values. "ORE" is noted in several places in this block (map 269DF).

The best available guide to grade of the deeper, primary ore probably is that mined in the last two years of milling in 1918-19, when gold grade fell to 0.11 oz/ton and silver to 11.87 oz/ton, apparently due to decreasing enriched ore and increasing primary ore in the mill feed. At present prices this would be $41.47/ton, or after .15 loss in flotation, $35.25/ton. However, the 1918-19 ore probably was sweetened with some upper enriched ore, which is likely to be scarce below the 1300 L. To compensate for this, the estimated recoverable value in Block C is reduced to $30/ton. With mining costs of $14.50/ton (Table 2), operating profit would be $15.50/ton. The longitudinal stope map indicates that at least half as much ore remains on the projection of these two ore shoots from the 1300 to 2000 L as has been mined, i.e., 200,000 tons, which at $15.50/ton would mean $3,100,000 operating profit.

D) Between the two main ore shoots to the 1300 L: The old miners no doubt left this ground a half century ago for one of two sound reasons: (1) it did not pay; or (2) they did not find it. In

either case, the greatly increased precious metal prices and new mining and milling methods may now make much of this ground profitable. The old stope map has a large notation here, "POSSIBLE ORE".

Operating costs here should be about the same as for other shallow mining, estimated at $12.50/ton. The expectable grade would be less than that mined in the ore shoots, possibly around $40/ton Au+Ag instead of $65/ton. Much more ground remains between the two ore shoots above the 1300 L than was stoped, so at least as much ore should remain there as was mined, i.e. 400,000 tons. A metal value of $40 x .85 recovery - $12.50 costs = $21.50/ton operating profit, or $8,600,000 for 400,000 tons.

E) Between the two main ore shoots, 1300-2000 L: This block of ground was explored only on the 1600 L. Its ore possibilities are not as good as the downward extensions of the two known ore shoots, but it has potential for considerable primary low-grade ore. The grade is likely to be lower than Block C above it, or Block B (on either side), perhaps showing an operating profit of some $10/ton. Tons/vertical feet should be similar to that produced: 400,000 tons from 1300 vertical feet = about 300 tons/vertical foot, or 210,000 tons for 700 ft, making $2,100,000 expected operating profit.

F) Below the 2000 L to 3000 ft depth: Exploration bottomed at the 2000 L presumably because the deeper primary ore was not then commercial, rather than because of any sharp change in grade or character of the ore. The Extension shaft system, the only service shaft for the deep workings, must have made ore hoisting very expensive with its 4 step-off shafts: to get ore from the working face of the 200 L to the Extension shaft collar apparently required about 11 handlings! (map 269DF). The primary gold-silver mineralization probably extends considerably deeper than the 2000 L. In an epithermal vein, such deeper ore could expectably continue to 3000 ft or more depth. The tonnage/vertical foot might be much more, or less, than that stoped in the shallower workings. However, assuming it

is roughly the same (300 tons/foot of depth), 1000 ft more depth would mean 300,000 tons. Grade of such deeper ore can only be conjectured. It may be the same as that in Blocks B and D, above it, but more likely both gold and silver will decrease; and copper, and possibly lead, may increase somewhat. With $2/ton more for mining costs, the operating profit thus may decrease to around $6/ton, or $1,800,000 for 300,000 tons.

G) Extension of Wonder vein zone to NW: For several miles NW of Wonder, the Hidden Treasure, Jackpot, Great Eastern, and many smaller mines are located roughly along the projection of the Wonder vein zone. Some of this ground already is controlled by the Lovestedt lease. Important ore bodies may be localized on fractures near the intersection of the Wonder vein zone and the inferred WNW-striking regional fault. This whole section deserves careful study.

H) Other veins: Many nearby veins have been reported, mainly in the footwall of the Wonder vein zone. Only two important crosscuts are shown on the old workings; both on the 1300 L: a 300-ft hanging wall crosscut, and a 400-ft footwall crosscut; the lack of drifting on either crosscut indicates that no commercial vein was cut. However, important nearby veins may remain undiscovered in the walls of the Wonder vein zone.

The two main ore shoots appear to rake about 60°N. The Nevada Wonder ore shoot ends sharply northward, along a N60°-raking line suggesting structural control. No marked roll in the vein is indicated here by the pattern of drifts, so this control might be a vein intersection. Cross-cutting or long-holing from several levels along the strike-length of the Wonder vein zone could test for other veins. If accessible, the crosscuts on the 1300 L should be examined. Veins may have been cut which were not considered worth exploring then; or the maps may not be up-to-date as of the last workings.

I) Dumps: A considerable tonnage now making ore grade may exist in the large waste dumps left from early mining. The dump near

the Nevada Wonder shaft sampled by Claude Iovestedt ran $2.89 Au+Ag values at present prices, or $2.46 recoverable values. This dump should be systematically sampled by drilling or pitting through it to bedrock. The lower part, from the earlier workings, may run better. Even a value of $2 should be profitable to run, once the mill is working.

J) Tailings: The 200,000 tons of tailings were sampled at reported grades of $4.90-5.00/ton Au+Ag, present prices. These would be very profitable to treat if a fair recovery can be made. They should be systematically check-sampled, from surface to bottom.

K) Base metal values: Smelter returns from old production show only negligible quantities of Cu and Pb - less than 0.1%. However, these metals probably will be more abundant in future deeper mining, and may make an appreciable byproduct. They may also be more abundant in the upper levels than indicated by the minor amounts in production records: the old mining would have avoided sulfides, as unamenable to cyanidation, and especially copper, which is a cyanicide.

Of the eleven classes (A-K) of possible ore just considered, (Table 3, p.25) data is now sufficient to estimate total recoverable values for only five - B, C, D, E and F, and even these are really "guestimates" - they may be too high, but more likely are too low. The recoverable values estimated for these four ore types total $23,700,000 from 1,310,000 tons of mill feed for an average of $14.50/ton operating profit. In a 300-ton mill, daily operating profit would range from $1,800 to $6,450, depending on ore grade. Assuming 300 working days/year, the total operating life for ore types B-E would be about 12 years (Table 3). Once a mill is operating, some of the other six ore-types should also become commercially important.

Dr. H. R. Cooke Jr.
COOKE, EVERETT & ASSOCIATES, INC.

Reno, Nevada
June 5, 1973

Table 3. Estimated possible ore

Ore type	Grade oz/ton Au	Grade oz/ton Ag	Recoverable[a] value, $/ton present prices[b]	Operating costs $/ton	Operating profit $/ton	Operating profit 300T/day	Short tons	Days life 300T/day	Total recoverable value, $
A. Open-cut									
B. NV Wonder ore shoot, 700-1300 L	.18	.18	53	12.50	40.50	12,650	200,000	667	8,100,000
C. NV Wonder & Extension ore shoots, 1300-2000 L			30	14.50	15.50	4,650	200,000	677	3,100,000
D. Between ore shoots to 1300 L			34	12.50	21.50	6,450	400,000	1,333	8,600,000
E. Between ore shoots, 1300-2000 L			[illegible]	14.50	10.00	3,000	210,000	700	2,100,000
F. 2000-3000 L				16.50	6.00	1,800	300,000	1,000	1,800,000
G. Wonder vein extension NW									
H. Other veins									
I. Dumps (NV Wonder)	.0087	.81?	2.46?						
J. Tailings (NV Wonder)	.014	1.4 ?	4.16?				200,000	677	
K. Base metals									
Ore:							1,310,000	4,366	23,700,000
Tails:							200,000	677	

a - At 85% flotation recovery

b - Gold at $100/oz, silver at $2.50/oz

Present data is insufficient to complete this table.

See map 269DF for locations of ore types.

TABLE 4/- Gold, silver, copper, and lead production from Wonder district, Churchill County, Nevada, 1907-37, in terms of recovered metal (Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines).

Year	Lode					
	No. of mines	Ore,	Gold		Silver	
		Short tons	Fine ounces	Value	Fine ounces	Value
1907.....	3	133	356.38	$7,367	10,993	$7,255
1908.....	6	408	362.13	7,486	79,187	41,969
1909-10..	-	-	-	-	-	-
1911.....	1	9,797	2,476.00	51,183	171,900	91,107
1912.....	1	28,376	7,589.87	156,897	474,316	291,704
1913.....	1	41,870	9,534.00	197,085	699,163	422,294
1914.....	4	50,121	9,715.58	200,839	914,547	505,741
1915.....	2	58,399	9,790.88	202,395	1,175,953	596,208
1916.....	3	58,142	8,955.89	185,135	1,023,288	673,323
1917.....	2	55,804	7,512.74	155,302	816,905	673,130
1918.....	5	49,741	4,883.41	100,949	603,528	603,528
1919.....	5	40,604	5,622.71	116,232	467,283	523,357
1920.....	4	1,218	517.57	10,699	14,505	15,810
1921.....	1	2	1.63	34	2	2
1922.....	2	24	14.89	308	1,755	1,755
1923.....	-	-	-	-	-	-
1924.....	1	1	.38	8	86	58
1925.....	-	-	-	-	-	-
1926.....	1	100	102.67	2,122	902	563
1927-30..	-	-	-	-	-	-
1931.....	3	416	245.20	5,069	13,377	3,879
1932.....	1	200	13.80	285	214	60
1933.....	-	-	-	-	-	-
1934.....	4	1,697	1,173.76	41,023	2,619	1,693
1935.....	2	233	42.76	1,497	14,648	10,528
1936.....	3	364	133.86	4,685	14,009	10,850
1937.....	3	705	294.00	10,290	24,970	19,315
Total.	-	398,355	69,340.11	1,456,890	6,524,150	4,494,132
			0.176 o/T	$21.01/o	16.4 o/T	$0.69/o

APPENDIX IIA-2

(right page)

TABLE 4 - Gold, silver, copper, and lead production from Wonder district, Churchill County, Nevada, 1907-37, in terms of recovered metal (con.

(Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines)

Year	Lode					
	Copper		Lead		Total value	Average recoverable value of ore per ton 1/
	Pounds	Value	Pounds	Value		
1907	-	-	-	-	$14,622	$109.94
1908	-	-	-	-	49,455	121.21
1909-10	-	-	-	-	-	-
1911	-	-	-	-	142,290	14.52
1912	-	-	-	-	448,601	15.81
1913	-	-	-	-	619,379	14.79
1914	-	-	62	$2	706,585	14.10
1915	-	-	-	-	798,603	13.67
1916	4,564	$1,123	3,350	231	859,812	14.79
1917	-	-	-	-	828,432	14.85
1918	1,336	330	602	43	704,850	14.17
1919	-	-	-	-	639,589	15.75
1920	-	-	36	3	26,512	21.77
1921	-	-	-	-	36	18.00
1922	-	-	-	-	2,063	85.96
1923	-	-	-	-	-	-
1924	-	-	-	-	66	66.00
1925	-	-	-	-	-	-
1926	-	-	-	-	2,685	26.85
1927-30	-	-	-	-	-	-
1931	-	-	-	-	8,948	21.51
1932	-	-	-	-	345	1.73
1933	-	-	-	-	-	-
1934	-	-	270	10	42,726	25.18
1935	-	-	-	-	12,025	51.61
1936	-	-	-	-	15,535	42.68
1937	-	-	-	-	29,605	41.99
Total	5,900	1,453	4,320	289	5,952,764	14.94

1/ Not to be confused with average assay value of ore.

APPENDIX IIB-1

...ODUCTION OF NEVADA WONDER MINE

"Schedule A"

*Tons Produced	**Price Gold	**Price Silver	*Year Produced	*Yearly Production Gold oz.	Silver oz.	Cu lbs.	Per Ton Gold oz.	Silver oz.	Cu%
88 smelted	$20	$ .65	1907	111.48	8,346		1.266	94.80	
59 smelted		.52	1908	112.63	3,783		1.900	64.11	
		.51	1909						
		.53	1910						
9,797 milled		.53	1911	2,476.00	171,900		.253	17.55	
8,376 milled		.60	1912	7,523.87	472,958		.265	16.83	
1 smelted		.60	1912	66.00	1,358		66.000	1358.00	
1,870 milled		.59	1913	9,534.00	699,163		.228	16.85	
0,115 milled		.54	1914	9,704.00	914,511		.194	18.24	
8,394 milled		.49	1915	9,779.00	1,175,839		.167	20.33	
8,131 milled		.65	1916	8,955.31	1,023.046		.154	17.60	
5,800 milled		.81	1917	7,512.74	816,852		.135	14.63	
9,710 milled		.96	1918	4,618.00)	557,924)		.098	12.34	
smelted		.96	1918	259.00)	43,741)				
9,570 milled		1.11	1919	5,612.00	462,294		.138	11.39	
8 smelted		1.00	1920	2.88	284		.360	35.50	
		.62	1921						
3 smelted		.67	1922	2.89	394		.963	131.33	
		.64	1923						
		.66	1924						
		.69	1925						
100 smelted		.62	1926	102.67	902		1.030	9.20	
		.56	1927						
		.58	1928						
		.52	1929						
		.38	1930						
83 milled		.28	1931	31.59	2,484		.380	29.93	
329 smelted		.28	1931	206.44	10,270		.627	31.52	
		.27	1932						
		.34	1933						
	35	.47	1934						
35 smelted		.64	1935	6.32	509		.181	14.54	
292 smelted		.45	1936	119.57	8,787		.409	30.10	
588 smelted		.44	1937	271.00	19,901		.461	33.84	
1,419 smelted		.43	1938	573.00	39,242		.404	27.66	
2,227 milled		.39	1939	388.00	29,852		.174	13.40	
3,378 smelted		.39	1939	1,237.00	84,678		.366	25.06	
4,871 milled		.34	1940	1,192.00	85,373		.245	17.52	
756 smelted		.34	1940	220.00	21,227	1284	.298	28.07	8½
4,388 milled		.34	1941	781.00	56,535		.178	12.88	
1,671 milled		.38	1942	199.00	14,793		.119	8.85	
1,059	Total Produced			71,597.39	6,726,946	Average	.423	39.00	
							2.852	78.22	
							1,423	29.00	not big one

Total Production in Dollars:

Gold	@ $35.00	$ 2,505,908.65
Silver	@ $ 1.293	8,697,941.18
Total Values		$11,203,849.83

Mine closed
June 30, 1942.

*United States Department of Interior
Bureau of Mines
450 Golden Gate Avenue
Box 36012
San Francisco, California

**Historical Statistics of the United States
Prepared by Bureau of the Census

CERTIFICATE

I, Dr. H. R. Cooke Jr., do hereby certify that,

1. I am a consulting mining geologist with offices at 421 Court St., Reno, Nevada, doing business as Cooke, Everett & Associates, Inc., of which company I am president.

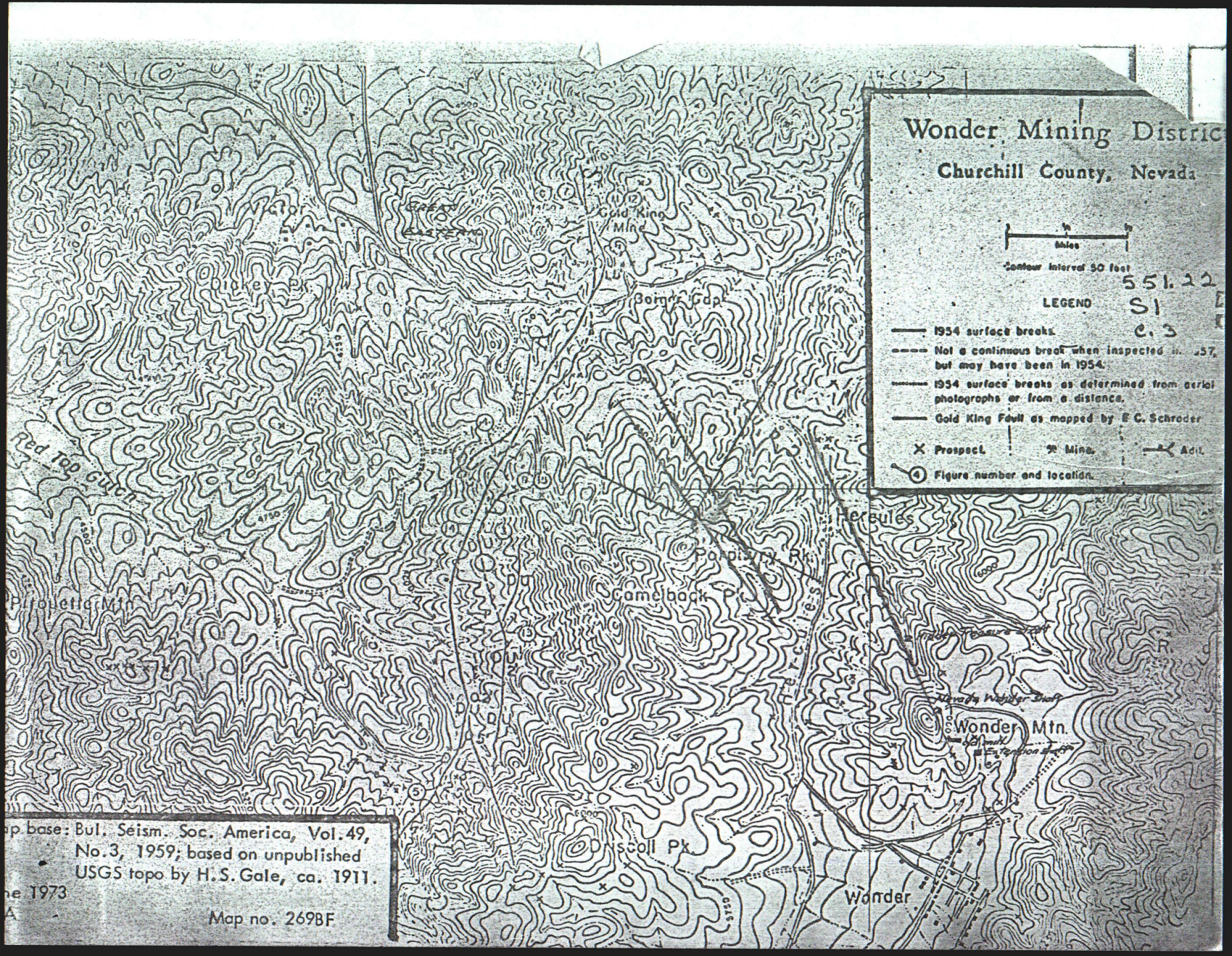
2. I am a graduate of the Mackay School of Mines, University of Nevada, and received a Ph.D. in mining geology from Harvard University. I am a registered professional engineer in Geological Engineering, Nevada, No. 1420; a Certified Professional Geologist, No. 1633, American Institute of Professional Geologists, and am a member of the American Institute of Mining, Metallurgical and Petroleum Engineers, the Canadian Institute of Mining & Metallurgy, and other professional societies. I have been a practising mining geologist for twenty-eight years.

3. I have no interest, directly or indirectly, in the property covered by this report.

4. This report is based on personal examination of the property in April, 1972, and upon various other information and reports as referred to herein.

H. R. Cooke Jr., Ph.D., P.Eng., CPG

Dated at 421 Court St.
Reno, Nevada
June 8, 1973

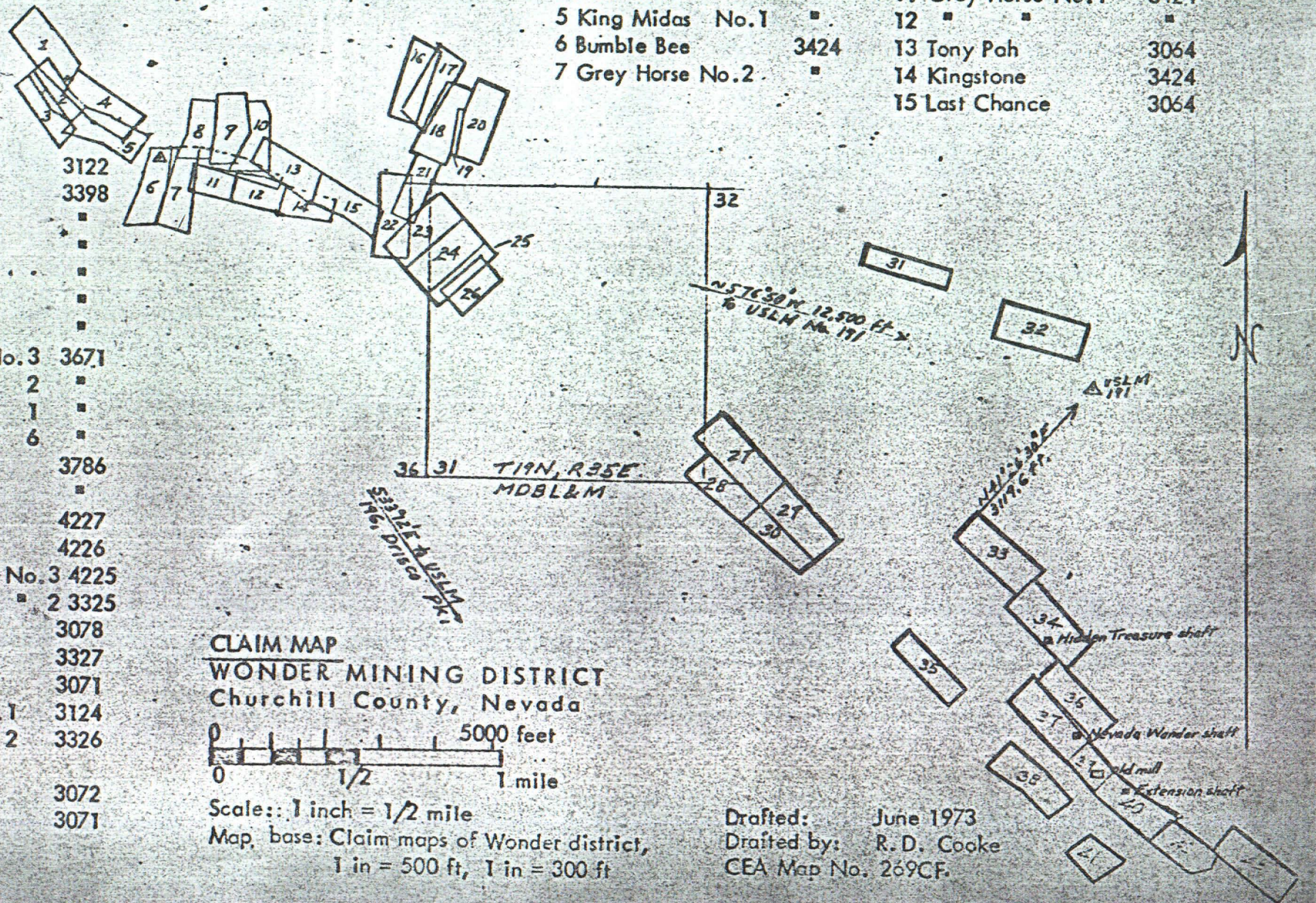

Wonder Mining Distric
Churchill County, Nevada
Miles
Contour interval 50 feet
LEGEND
1954 surface breaks.
Not a continuous break when inspected in 1957, but may have been in 1954.
1954 surface breaks as determined from aerial photographs or from a distance.
Gold King Fault as mapped by E.C. Schroder
Prospect.
Mine.
Adit.
Figure number and location.
551.22
S1
C.3
Gold King Mine
Dickey Pk.
Boiler Gap
Red Top Gulch
Hercules
Porphyry Pk.
Camelback Pk.
Wonder Mtn.
Nevada Wonder Shaft
Driscoll Pk.
Wonder
Map base: Bul. Seism. Soc. America, Vol. 49, No. 3, 1959; based on unpublished USGS topo by H.S. Gale, ca. 1911.
Map no. 269BF

CLAIMS, LOVESTEDT LEASE

16 Great Eastern No. 3 3126
17 " " " 4 3122
18 " " " 1 "
19 " " Fraction "
20 Great Eastern 3122
21 Little Witch 3398
22 Nevada "
23 Silver Tip "
24 Valley View "
25 Pan Handle "
26 Yellow Jacket "
27 Golden Dawn No. 3 3671
28 " " " 2 "
29 " " " 1 "
30 " " " 6 "
31 Queen No. 8 3786
32 " " 5 "
33 North Star 4227
34 Hidden Treasure 4226
35 Nevada Wonder No. 3 4225
36 " " " 2 3325
37 " " 3078
38 Ruby No. 2 3327
39 Ruby No. 1 3071
40 Lost Chance No. 1 3124
41 " " " 2 3326
(SE 1/2)
42 B & S 3072
43 Scorpion 3071

CLAIMS, OUTSIDE LOVESTEDT LEASE

1 King Midas 3885
2 " " No. 2 "
3 " " " 3 "
4 Lost Chord "
5 King Midas No. 1 "
6 Bumble Bee 3424
7 Grey Horse No. 2 "
8 Long Nel 3064
9 Wasp "
10 Spider "
11 Grey Horse No. 1 3424
12 " " "
13 Tony Pah 3064
14 Kingstone 3424
15 Last Chance 3064



CLAIM MAP
WONDER MINING DISTRICT
Churchill County, Nevada

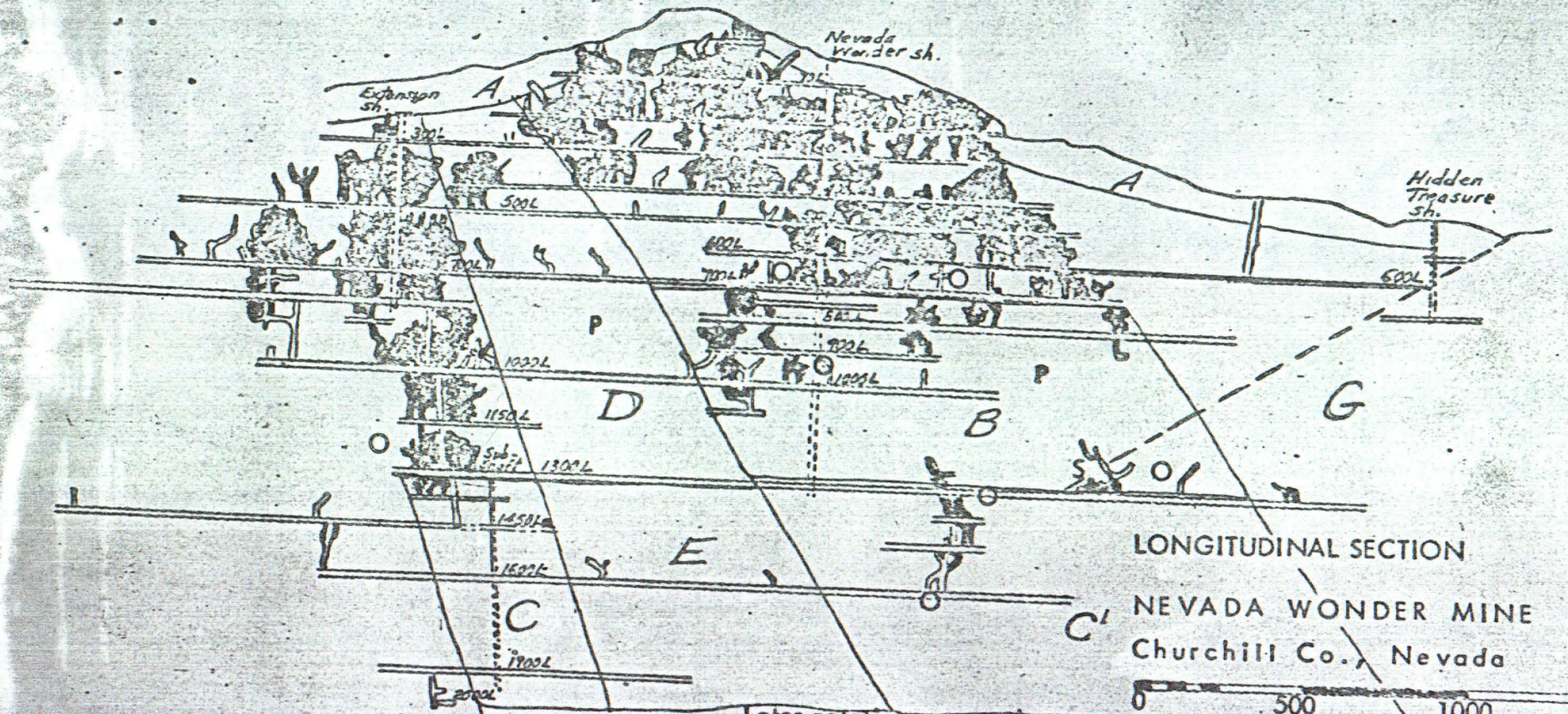
Scale:: 1 inch = 1/2 mile
Map base: Claim maps of Wonder district, 1 in = 500 ft, 1 in = 300 ft

Drafted: June 1973
Drafted by: R. D. Cooke
CEA Map No. 269CF.

1" = 560'

SOUTHEAST

NORTHWEST



LONGITUDINAL SECTION

NEVADA WONDER MINE

Churchill Co., Nevada

0 500 1000 1500 ft

Scale: 1 inch = 500 feet

Map base: MAP OF NEVADA WONDER STOPES, Dec. 31, 1919, with later notations; 1 inch = =00 feet

Drafting: R. D. Cooke June 1973

COOKE, EVERETT & ASSOC., INC.

Map no. 269DF

Later notations on map base

O ore
S sulfide ore
P possible ore

Red - Possible ore block

Blue - Stage 1 proposed entry
Green - Stage 2 proposed entry

Wonder Report

Page 12

New W. vein N. W. vein Strike N 25 W dips 75 NE, tested for 3400 ft laterally 2000 ft. vertically up to 40' thick

Badger Vein 11'S NW Wonder vein a few ft to SW but narrower & lower grade

W. A. BOWES & ASSOC. — Fire Assay / Spec
P O Box 160, Steamboat Springs
Colorado 80477

QUANTITATIVE SPECTROGRAPHIC ANALYSIS

FILM NO. 5-11-22

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH

DATE 11/4/11

Fe, Mg, Ca, B, Ti reported in %, all other elements reported in ppm. Appendix IA-3

Plate No.	Office No.	Field No.	Au	Ag	Cu	Pb	Zn	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	Au
1	Reference		oz.			Au	Ag																										
2	27132	CRW-1				N	L																										0.05
3	27139	CRW-2	.065	7.8		N	70																										1.0
4	27144	CRW-3	.01	2.6																													0.3
5	27145	CRW-4	.03	6.7																													0.9
6	27146	CRW-5	N	.22																													0.1
7	27140	CRW-6	.1	1.4		N	50					1																					0.1
8	27147	CRW-7	.21	41.3																				1									10
9	27148	CRW-8	.18	8.5																													7.3
10	27141	CRW-9				N	1																										0.0
11	27149	CRW-10																															0.2
12	27150	CRW-11																															0.1
13	27142	CRW-12				N	N																										0.0
14	27151	CRW-13																															7.0
15	27152	CRW-14																															0.1
16	27153	CRW-15	.29	12.7													1																15.0
17	27143	CRW-16				N	7																										0.07
18																																	
19																																	
20																																	
21																																	
22																																	
23																																	
24																																	
Lower Detection Limit →	10	0.5	5	10	200	5	0.05%	50	5	5	5	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.01%	0.02%	0.005%	.002%	.02

N = Not detected. L = Detected, but below limit of determination. G = Greater than value shown.

REMARKS: AA gold

Job 404

CODED BY

ANALYST Aem

Appendix IA-3 Item 81

Appendix IA-4

P. O. BOX 160, Steamboat Spgs. Colorado 80477

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH

Fe, Mg, Ca, Ti, Na, K, Si & Al reported in %, all other elements reported in PPM

Appendix IA-4

FILM 20-11

DATE 5-8-72

Plate No.	Office No.	Field No.	Au	Ag	Cu	Pb	Zn	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	Na	K	Si	Al	P
0	Reference	7080	N	30	1000	G 10%	3000	100	2.	N	70	30	100	N	N	500	70	100	N	N	100	L	2000	3	50	L	N	200	N	L	.3	.3	L	6.	20.	7.	.1
1	27138	CRW-1	N	L	7	50	N	N	2.	N	5	N	50	N	N	N	100	50	N	N	100	L	1000	2	N	L	N	200	N	.3	.2	.2	3.	4.	30.	6.	L
2	27139	CRW-2	N	70	15	50	N	5	.7	N	5	N	70	N	N	N	150	20	N	N	100	L	100	5	N	L	N	L	N	.1	.1	.05	N	1.	G 30.	3.	L
3	27140	CRW-6	N	50	10	20	N	10	1.	N	5	N	100	N	N	N	100	50	N	N	200	L	700	3	N	L	N	100	N	.1	.2	.3	L	2.	G 30.	5.	L
4	27141	CRW-9	N	1	20	50	N	5	5.	N	5	N	20	N	N	N	200	70	N	N	200	10	1000	2	N	L	N	200	N	.3	.3	.3	L	3.	30.	6.	L
5	27142	CRW-13	N	N	10	20	N	L	1.5	N	5	N	50	N	N	N	150	50	N	N	100	L	1000	2	N	L	N	100	N	.7	.1	.3	2.	3.	G 30.	6.	L
6	27143	CRW-16	N	1	15	20	N	N	1.	N	5	N	70	N	N	N	150	30	N	N	50	L	500	5	N	L	N	L	N	.1	.05	.1	.5	2.	G 30.	3.	N
7			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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Lower Detection Limit *			10	0.1	5	10	200	5	0.05%	50	5	10	20	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.05	0.02%	.001%	0.2%	0.5%	1%	0.5%	.1%

N - Not detected L - Detected, but below limit of determination G - Greater than value shown

REMARKS 6 only For Spec.

16 Samples total. Fire assay & AA

JOB NO: 404 Comp. Rpts

CUSTOMER: Cook

KEYPUNCH CODE

ANALYST Tillman

Appendix IA-5

A. BOWER & ASSOCIATES
P. O. BOX 160, Steamboat Spgs.
Colorado 80477

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS

INSTRUMENT: WADSWORTH MOUNTED, JARRELL-ASH, 1.5 METER, DC ARC EMISSION SPECTROGRAPH
Fe, Mg, Ca, Ti, Na, K, Si & AL reported in %, all other elements reported in PPM

DATE 5-10-

Plate No.	Office No.	Field No.	Au	Ag	Cu	Pb	Zn	Mo	Fe	W	Ni	Co	Cr	Cd	As	Sb	Mn	V	Bi	Sn	Zr	B	Ba	Be	La	Nb	Sc	Sr	Y	Ca	Mg	Ti	Na	K	Si	Al	P
0	Reference	7080	N	3																																	
1	27144	Crw-3	N	L																																	
2	27145	4	N	2																																	
3	27146	5	N	7																																	
4	27147	7	10	6 20																																	
5	27148	8	10	2																																	
6	27149	10	N	5																																	
7	27150	11	N	2																																	
8	27151	13	N	L																																	
9	27152	14	N	5																																	
10	27153	15	10	4																																	
11		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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Lower Detection Limit			10	0.5	5	10	200	5	0.05%	50	5	10	20	20	200	100	10	10	10	10	10	10	10	2	20	10	5	100	10	0.05	0.02%	.001%	0.2%	0.5%	1%	0.5%

N - Not detected L - Detected, but below limit of determination G - Greater than value shown

REMARKS Au - Ag only.

JOB NO: 404

CUSTOMER: H. P. Cooke

KEYPUNCH CODE

ANALYST