6000 0587

Mining District File Summary Sheet

DISTRICT	Rosebud
DIST_NO	4010
COUNTY If different from written on document	Pershing
TITLE If not obvious	Rosebud Drill Hole File - Hole No. RS-475-99
AUTHOR	M. Niomi; D.G Mackerrow; K. Allen; R. Kellner;
DATE OF DOC(S)	1999
MULTI_DIST Y / N? Additional Dist_Nos:	
QUAD_NAME	Sulphur 7.5'
P_M_C_NAME (mine, claim & company names)	Rosebud Mine; Rosebud Mining Co. LLC; Rosebud Project; Hecla Mining Co.
COMMODITY If not obvious	gold; silver
NOTES	drill logs; geology; assay; total depth 1600' negatives; photograph 85 p.

Keep docs at about 250 pages if no oversized maps attached (for every 1 oversized page (>11x17) with text reduce the amount of pages by ~25)

SS: DD 3/20/08
Initials Date

DB:
Initials Date

SCANNED:
Initials Date

Revised: 1/22/08

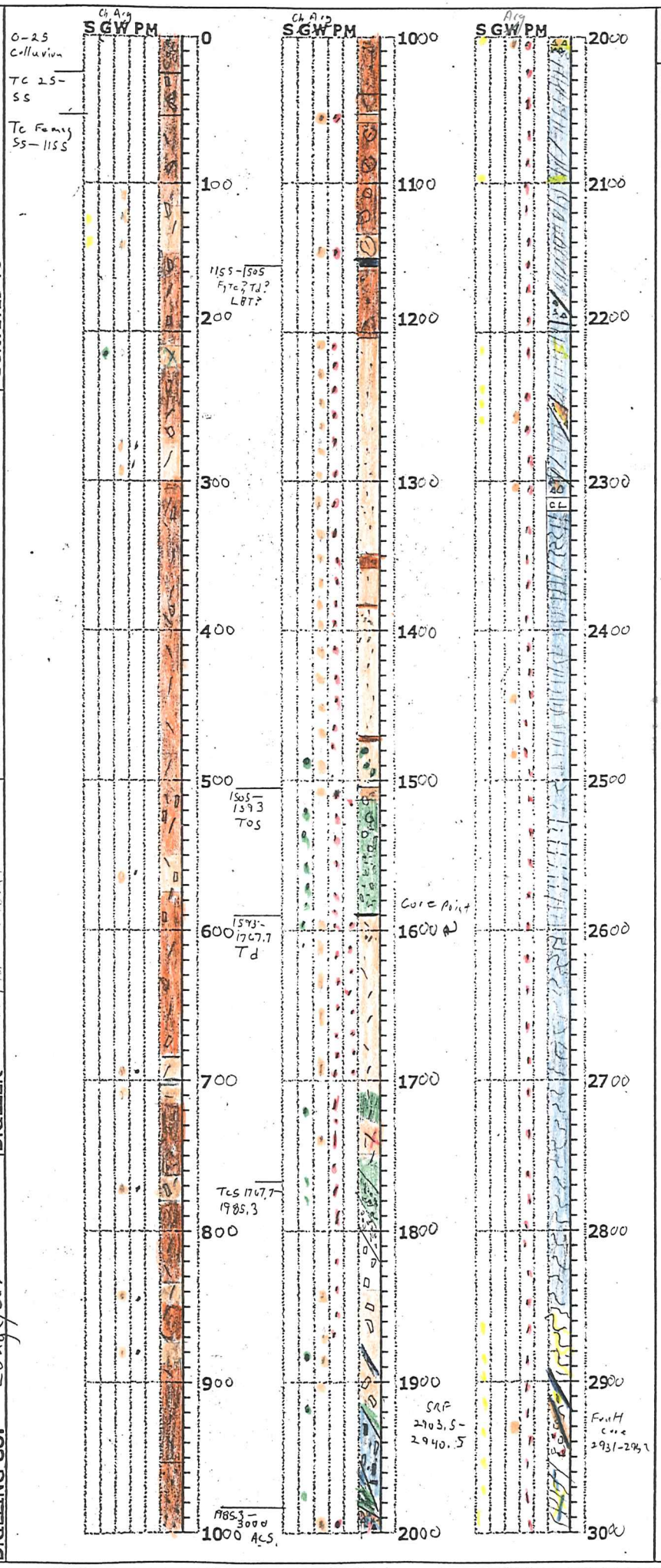
RS- 475 - 97

60000587
4010

6000 0587

ROSEBUD MINING COMPANY, LLC.

HOLE #	RS-475-99		
FINISH HOLE		T.D	3000
LOGGED BY	D.G. Mulherron	ANGLE	-60
START HOLE		SURVEYED TO	3000
HOLE TYPE	RC/core	BEARING	S 300° E
PAGE 1 OF 1			
COLLAR COORDINATES			
NORTH			
EAST			
ELEV			
DRILLER	Martin Nieri		
DRILLING CO.	Longyear		



ALTERATION INTENSITY

1 WEAK	2 MODERATE	3 STRONG

VERITHIN COLOR

737	SILICIFICATION
751	GREEN CLAY
747½	WHITE CLAY
755	PYRITE
757	MARCASITE

GRAPHIC LOG

VERITHIN COLOR

	BRECCIA
741	FAULT 741
	CONTACT
737	QUARTZ VEIN
741½	CALCITE VEIN
747½	CLAY VEIN
755	PYRITE VEIN

- Fe ox
- Argillic/white clay
- Sulfides
- Chlorite/Propy.
- Calcareous/Calcite Vn

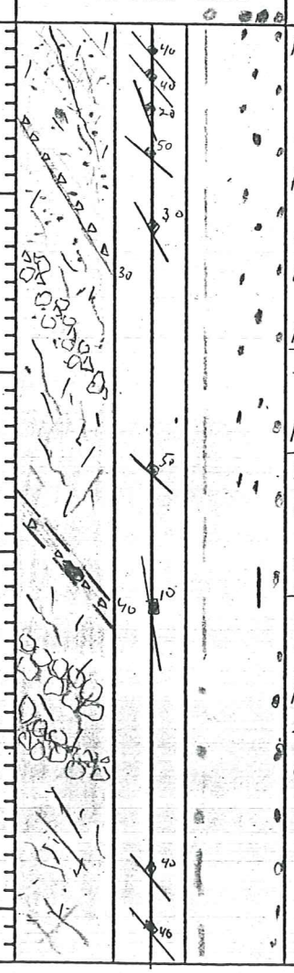
Hecla
MINING COMPANY

- faults, fractures
- FeOx
- sulfide
- calcite, carbonate
- argillization, white clays
- propylitization
- potassic alteration
- chlorite, chloritic clays

ROSEBUD PROJECT
DIAMOND DRILL LOG

HOLE NUMBER	RS-475-99	LOCATION	Near Mine Area
PAGE 1 OF 22		NORTHING	
DATE	9-29-99	EASTING	
LOGGED BY	D.G. Mackerrow	ELEVATION	
SCALE	1" = 10'	AZIMUTH	
TOTAL DEPTH		INCLINATION	

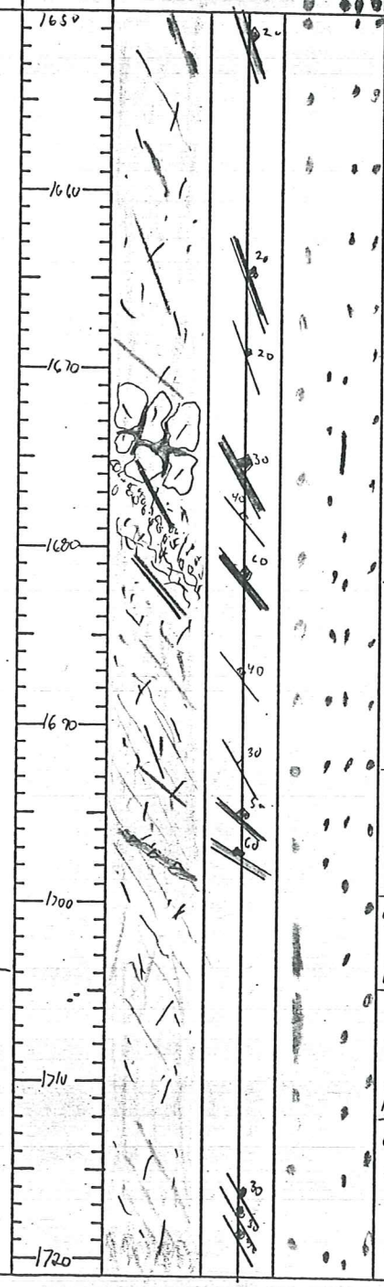
REMARKS: Surface exploration; Pilot to 1600

LITH	OX/RE	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
Td	R	1600-1767.7 DOZER Fine grain rhyolite, Pale greenish gray in color. Rock is in the footwall of a fault (Cove). Chlorite filled vesicle that appears slightly elongate in one axis Vesicles decrease at 1625	1600, 1610, 1620, 1630, 1640, 1650		Heavy fracturing from 1600 to 1619.5 and moderate fracturing to 1626.5 Heavy fracturing 1626.5-1635 1610-1610.5 Breccia clast in clay matrix 1617-1618 white clay healed fracture on narrow mosaic fracture 1618.9-1636 white clay on fracture and calcite vein fragments 1636-1642 Auto breccia texture with minor flow	1600-1636 moderate levels of white clay on fracture 1605-½" in diameter pyrite mass 1618.9-1626.5 white clay heals a weak mosaic breccia 1641 py/marc mix increases forming veinlets and small masses of dark sulfide. White clay veins and crackle breccia matrix continue

ANALYTICAL DATA						
FROM	TO	W	Au	Ag	Au2	A
1600	1603					
1603	1607					
1607	1612					
1612	1616.5					
1616.5	1618.9					
1618.9	1623					
1623	1626.5					
1626.5	1628.8					
1628.8	1631.3					
1631.3	1636					
1636	1639.1					
1639.1	1642					
1642	1646.5					
1646.5	1649.5					
1649.5	1654					

LITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
Td	R	1600-1767.7 DOZER Fine grain rhyolite flow contises. Textures vary between weakly flow banded and auto brecciated. Pale whitish gray color with a faint tint of green from chlorite in vesicles and on fractures 1718.5 Argillization ends and chloritic alteration dominates to 1733	Fracturing decreases below 1636 with 40° tca the dominate orientation. 1672.8 calcite healed auto breccia 1676 Vesicles alignment 1678-1680 Crackle Breccia 1697.3 2" white clay/calcite vein with fragments 1688.5 Flow foliation at 30° tca 1694-1717 moderate fracture with white clay	1649.5 high angle white clay healed Crackle breccia with mixed py/marc 1670 chlorite on fractures of trace levels 1684 Pyrite/marcasite masses decrease along with white clay 1715-1716.5 White clay filled fx up to ½" thick. Pyrite/Marci in the clay vein

FT

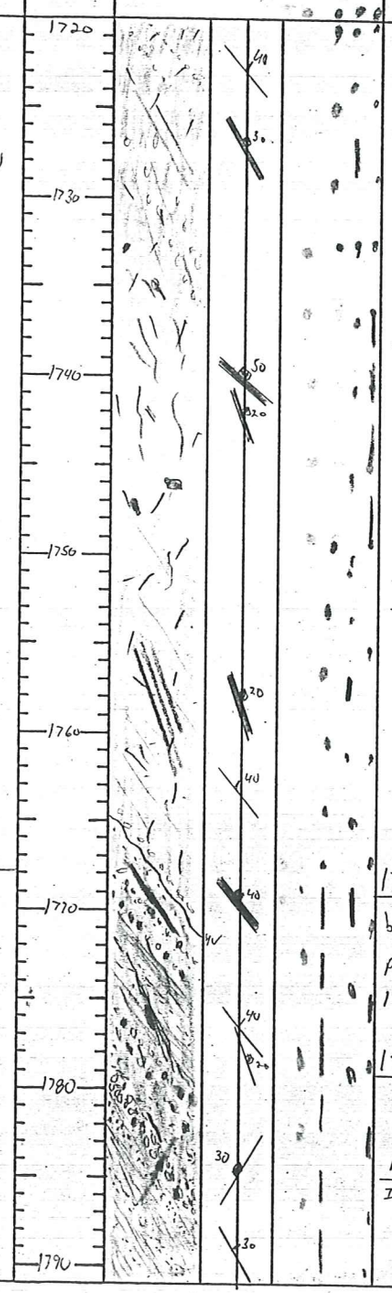


GRAPHIC LOG

1704 — fine white clay

ANALYTICAL DATA						
FROM	TO	W	Au	Ag	Au2	A
1649.5	1654					
1654	1657.8					
1657.8	1662.5					
1662.5	1667.5					
1667.5	1672.8					
1672.8	1678					
1678	1683.2					
1683.2	1688.5					
1688.5	1692.5					
1692.5	1697.5					
1697.5	1703.2					
1703.2	1707.5					
1707.5	1712					
1712	1717					
1717	1722					

ITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
Td	R	1600-1767.7 **DOZER** Fine grain rhyolite continuous small chlorite filled vesicles present. 1749.5-1767.7 Very regular flow banded Dozer. Contact with TCS is 40° tca with low amplitude irregularities Sulfide content is less the 1%	1727-1733 Vesicular bands are 0-50 tca	1733-1749.5 Argillization over prints chlorite Pyrite and pyrite after marcasite from veinlets and sulfide masses 1733-1749.5 Pyrite is 1-3% in vein and disseminated masses 1757-1758 Calcite vn swarm 1763-1767.7 spotty traces of silicification along individual flow band
TCS	R	1767.7-1807.9 **TCS EPICLASTIC SEDIMENTS AND RHYOLITE PORPHYRY** Variable grain size sediments from claystone to conglomerate. Bedding dips 30° tca clast of A.L.S. shale present in conglomerate. Clast size to ½" dia. A.L.S. content ≈ 30% Average grain size is granule	1767.7 Erosional contact between TCS and Td Phenocryst averaging 1-2 mm 1781.9 Pyrite on fracture 1789.5-1793 Increasing clay matrix	1767.8 ½" Calcite vein parallel to contact 1772 "2" Pyrite masses along a 20° tca fracture 1768.5 Finer grain clast are argillic. 1778 white clay on fr



ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
1722	1727				
1727	1733				
1733	1737				
1737	1742.5				
1742.5	1747.5				
1747.5	1749.5				
1749.5	1753				
1753	1758				
1758	1763				
1763	1767.7				
1767.7	1772.7				
1772.7	1776.1				
1776.1	1779				
1779	1784.5				
1784.5	1789.5				

ITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
TCS	R	1767.7–1807.9 TCS EPICLASTIC SEDIMENTS AND RHYOLITE FLOW Variable grain sized sediments from claystone to conglomerate. There is a fining up sequence that repeats at 1781.7 1791–1793 clay rich sandstone is pale gray green. 1793 medium to coarse sandstone with a high % matrix supporting grains. Core become purple gray from clay derived from conglomerate	1795–1801 Fracture zone with calcite veins 1807.9 Sharp contact between porphyritic flow and sandstone 1806.9–1807.9 Basal conglomerate.	1807.9 Pyrite in flow ≤ .1% Calcite veinlets and rinds on phenocrysts.
		1807.9 – 1896.5 TCS RHYOLITE PORPHYRY Porphyritic rhyolite flow. Dark purple brown with small Biotites and 7% feldspar phenos. Clast of rounded gray intrusive "float" in the intrusive. These light gray clasts have a higher Biotite content	1830–1840 Narrow flow breccia	1838.2–1846.7 Argillization 1841.5–1843.7 white clay on Fx 1859 Calcite vein with crystal development

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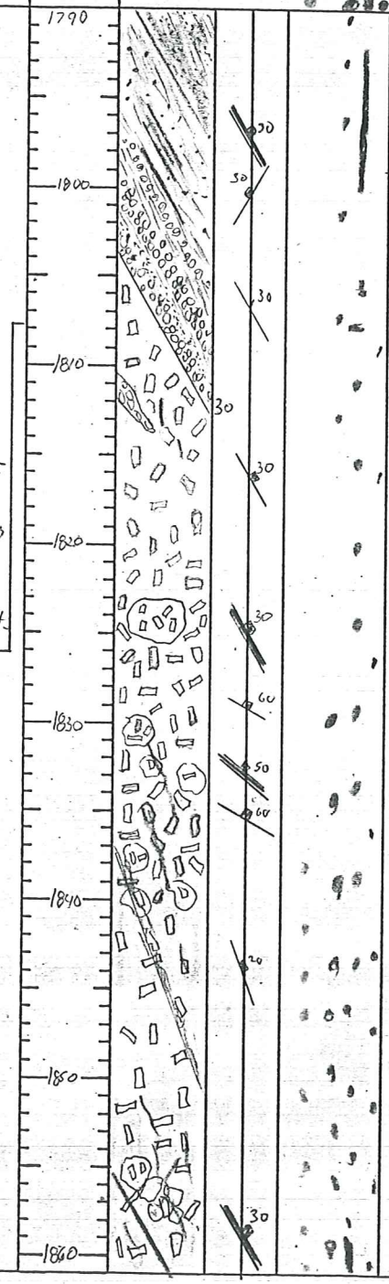


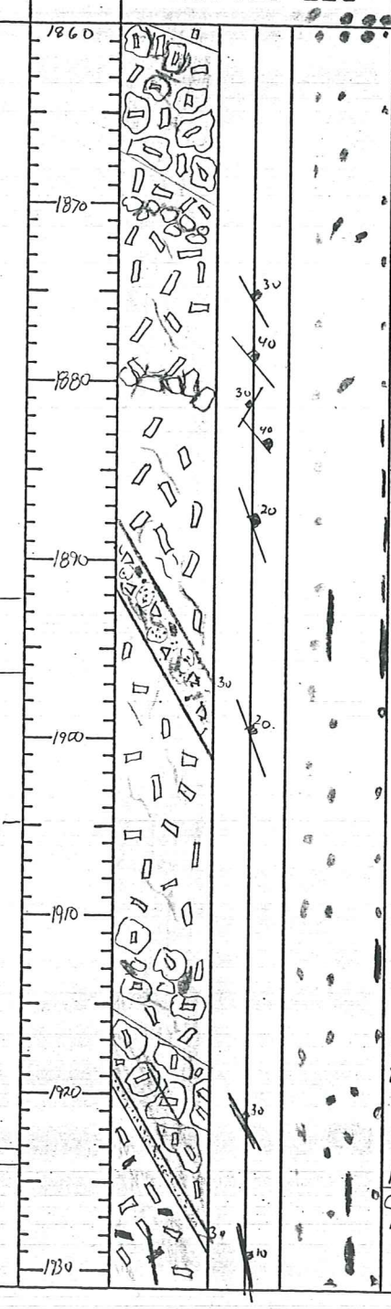
GRAPHIC LOG

ANALYTICAL DATA

FROM	TO	W	Au	Ag	.Au2
1789.5	1793				
1793	1797				
1797	1800				
1800	1803.1				
1803.1	1807.9				
1807.9	1813				
1813	1820				
1820	1830				
1830	1838.3				
1838.3	1843.7				
1843.7	1846.7				
1846.7	1851.1				
1851.1	1856.3				
1856.3	1860				

ITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
TCS	R	1807.9–1896.5 TCS RHYOLITE PORPHYRY Rhyolite porphyry with biotite and feldspar phenocrys. Pale green gray in color. 1892.4–1896.5 T.C.S. Sandstone in fault zone ALS. sand grains present 1896.5–1923.4 Rhyolite porphyry continues Pine 1905 white clay in fx 1923.4–1925.1 Epiclastic Sandstone with high % clay matrix 1925.1–1963.8 Rhyolitic Biotite Porphyry Pale gray biotite rich, Porphyry	1860–1885.3 Discontinuous Flow breccias 1870–1880 internal breccia with green clay matrix 1885.3 – 1903.5 Moderate intensity fracture zone, around central Breccia interval at 1892.4–1896.5 Footwall fractures continue to 1905 1921.8 – 1923.4 Basal breccia 1925.1 – 1927 Contact zone is moderately sheared	Chlorite stained internal flow breccia matrix 1870 white clay coat fine fractures 1883–1885 Disseminated pyrite weakly aggregate 1888–1896.5 Large pyrite (≤2") masses 1900–1905 white clay on fx 1919 phenocrys are rimed by calcite again 1923.4–1925.1 weak calcareous reaction 1925.1 Porphyry is calcareous

GRAPHIC LOG

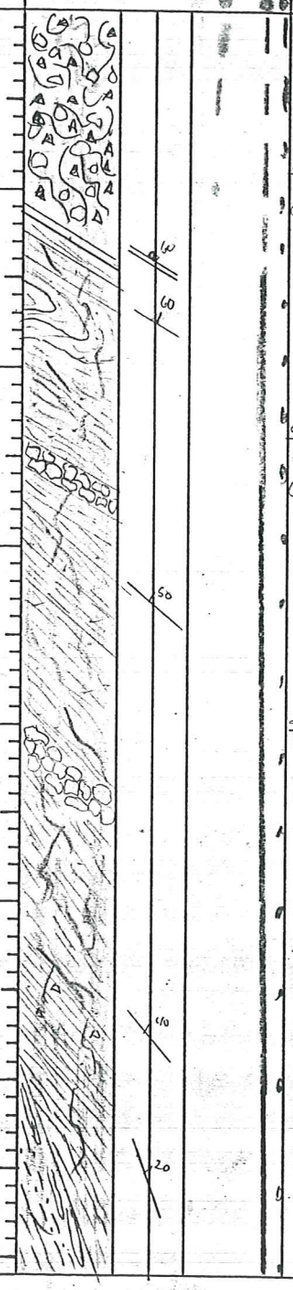


ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
1860	1870				
1870	1880				
1880	1885.3				
1885.3	1888				
1888	1890.5				
1890.5	1892.4				
1892.4	1896.5				
1896.5	1903.5				
1903.5	1909				
1909	1914				
1914	1919				
1919	1923.4				
1923.4	1925.1				
1925.1	1930				

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
TCS	R	1925.1-1963.8 TCS BIOTITE RHYOLITE PORPHYRY Porphoritic rhyolite flow of fine Biotite and feldspar phenocrysts. Flow is texturally different from first porphyry encountered	1930, 1940, 1950, 1960			Fine grained disseminated pyrite and pyrite veinlets	1930	1934.5				
							1934.5	1939.5				
							1939.5	1945				
							1945	1950				
		1963.8 - 1985.3 TCS EPICLASTIC SILTSTONE SANDSTONE AND CLAYSTONE Purple brown siltstone with narrow (2") beds of sandstone. Purple color fades from 1974-1976. Calcite vein and weak to moderate calcareous reaction	1970, 1980		1963.8 20° TCA Sharp contact Some sediment trap in flow	1963.8-1985.3 Pyrite below measurable levels in tcs	1950	1960.4				
							1960.4	1963.8				
							1963.8	1967.7				
						1972 - 1985.3 Chloritic alteration over prints purple brown claystone	1967.7	1972				
							1972	1976.5				
							1976.5	1980				
ALS.	R	1985.3-3000 ALS PHILLITIC SHALE AND SILTSTONE Black carbonaceous shale with fine disseminated py. Heavy calcite and qtz veining	1990, 2000		1985.3 Depositional contact 60° tca 1985.3 - 2013 Highly sheared zone below the contact	1985.3 Shale is hard but generally highly calcareous	1980	1985.3				
							1985.3	1987				
							1987	1991				
							1991	1994.5				
							1994.5	1997				
							1997	2001				

HOLE NUMBER RS-475-99 PAGE 7 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
A.L.S.	R	1985.3-3000 A.L.S. PHILLITIC SHALE AND SILTSTONE Interbedded phillitic shale and siltstone. Calcite veining is moderate to heavy 2013 core is moderate to highly calcareous shale and siltstone. 2067.4 - 2069.4 2" bedded qtz vein in siltstone bed between 2067.4 - 2073	2000 2010 2020 2030 2040 2050 2060 2070		2013 .5' calcite and quartz vein at base of shear zone below the contact. 2025 - 2027 Calcite healed crackle breccia 2042 - 2044 Internal bedded breccia 2054 - 2056 Crackle breccia	Syngenetic pyrite disseminated through the shale. Sediments are moderate to highly calcareous

ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
2001	2005				
2005	2008				
2008	2013				
2013	2017				
2017	2022				
2022	2028				
2028	2033				
2033	2037.5				
2037.5	2042				
2042	2050				
2050	2060				
2060	2067.4				
2067.4	2070.3				

ITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
ALS	R	1985.3-3000 ALS PHILLITIC SHALE AND INTERBEDDED SILTSTONE Dark gray black shale with light gray siltstone interbeds. Calcite veins cross cut bedding and locally show minor off sets in bedding 2127 - metamorphic quartz 3' Thick sheared on both sides	2095 - 3001 Crackle breccia associated with metamorphic qtz masses 3009-3009.5 Bedded crackle breccia 2123-2123.5 Sheared shale at 30° tca 2128-2130 Crackle breccia with weak shearing on a 40° tca plane	2095-2099 Silicification and micro veinlets of qtz. Traces of white clay with qtz vein

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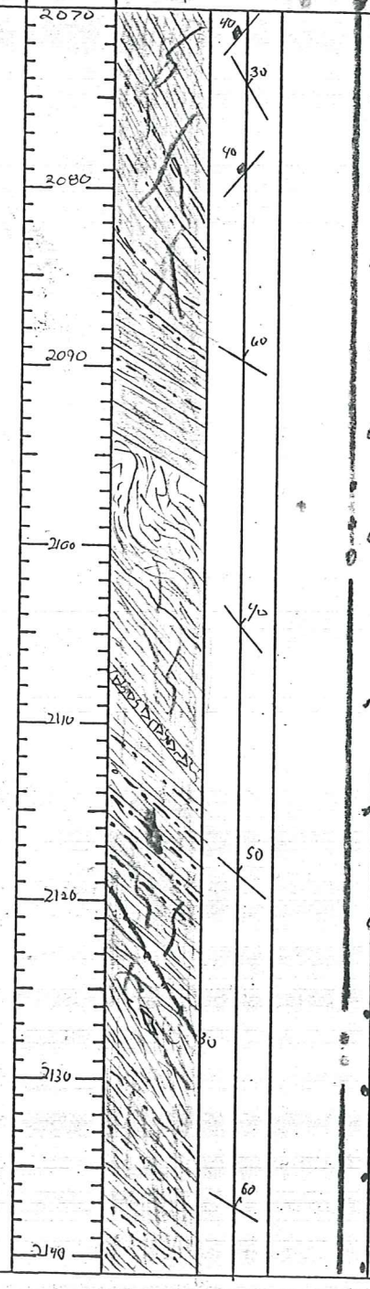

GRAPHIC LOG

ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
2070.3	2075				
2075	2081				
2081	2087.5				
2087.5	2095				
2094	2099				
2099	2107.5				
2107.5	2115				
2115	2124				
2124	2129				
2129	2134				
2134	2140				

HOLE NUMBER RS-475-99 PAGE 9 OF 24

ITH.	OX/RED.	LITHOLOGY	STRUCTURE	ALTERATION AND MINERALIZATION
ALS.	R	1985.3-3000 ALS PHILLITIC SHALE AND INTERBEDDED SILTSTONE Dark gray black sediments continue 2180-2194.8 Fault zone appears to be parallel to bedding	Minimal cross cutting fracturing 2163.5-2169.5 Local disrupted bedding 2180-2194.8 Fault zone with calcite and quartz stockwork. s	Syngenetic pyrite is very fine and only sulfi 2156.6-2160 Very fine qtz veinlets and weak silicification 2180-2194.8 spotty traces of silicification 2182-2182.6 metamorphic qtz mosc

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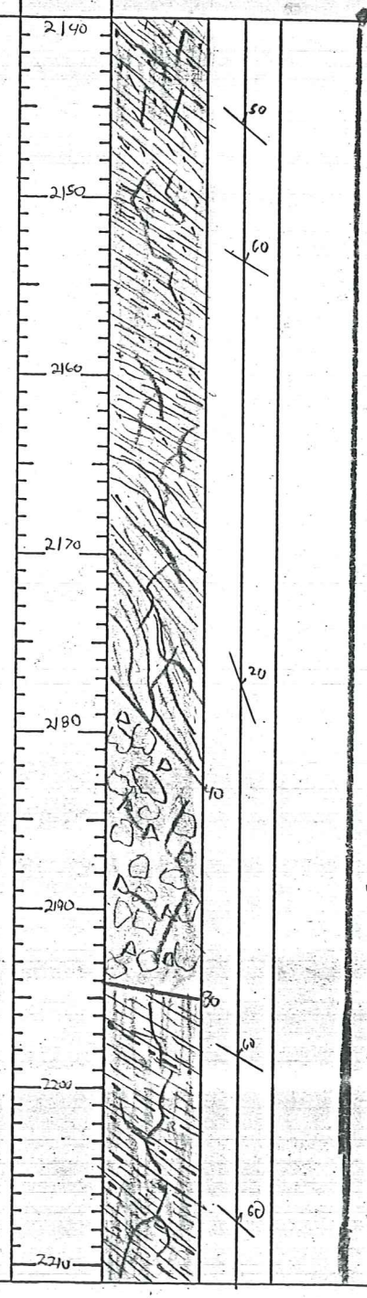
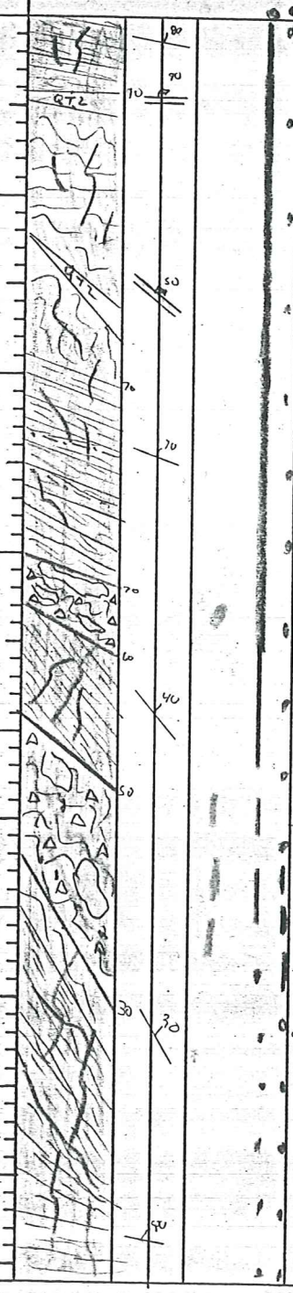


GRAPHIC LOG

ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
2140	2150				
2150	2156.6				
2156.6	2160				
2160	2165				
2165	2170.5				
2170.5	2175.5				
2175.5	2180				
2180	2185				
2185	2190				
2190	2194.8				
2194.8	2199.5				
2199.5	2207				
2205	2211.5				

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
ALS	R	1985.3–3000 ALS. PHILLITIC SHALE AND SILTSTONE Dark gray shale and Light gray siltstone continues Sediments are moderate to highly calcareous 2251–2261.2 Bedding plane shear with metamorphic qtz masses. 4" interval of coarse siltstone derived from reworked Tuff. Pyrite forms 1/8" aggregations. Selective silicification of the breccia	2210 2220 2230 2240 2250 2260 2270 2280		2220.7–2229.7 Bedding shear with high qtz vein lets 2241.3–2244.6 Metamorphic qtz in a bedding shear 2251–2261.2 Bedding shear with metamorphic qtz 2261.2 Bedding continues to be disrupted	2778–2282 spotty narrow silicification

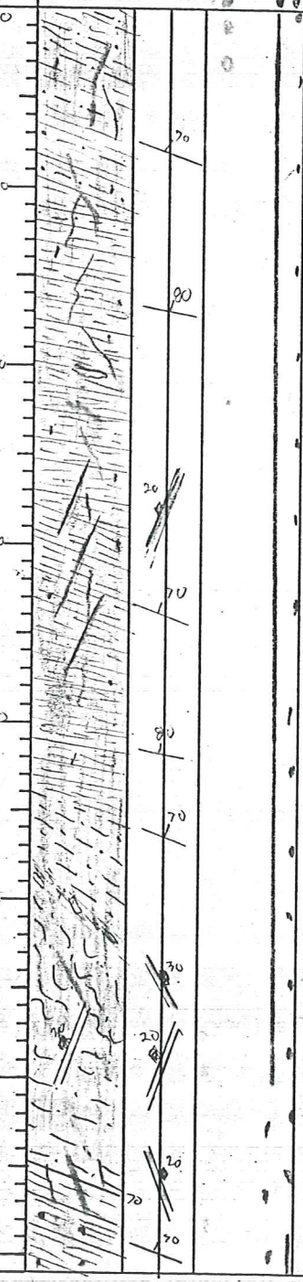
ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
2211.5	2220				
2220	2224.2				
2224.2	2229.7				
2229.7	2236				
2236	2241.3				
2241.3	2244.6				
2244.6	2251				
2251	2257.5				
2257.5	2261.2				
2261.2	2265				
2265	2270				
2270	2275.5				
2275.5	2280				

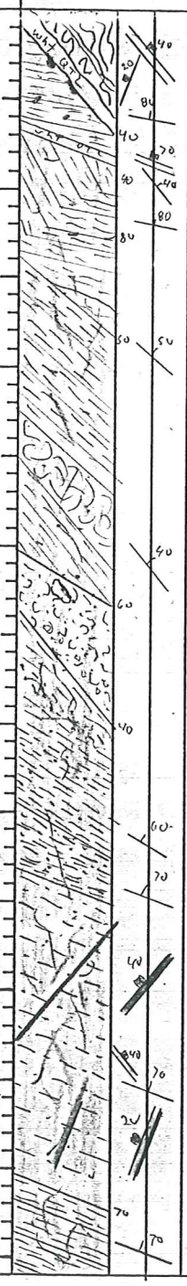
HOLE NUMBER R-475-99 PAGE 11 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
ALS.	R	1985.3–3000 ALS. PHILLITIC SHALE AND SILTSTONE. Black Shale and interbedded siltstone. 2301–2302 Sheared Intrusive.	2280, 2290, 2300, 2310	60, 50	2290 Bed becomes highly dirupted. Bedding become steep at 2297. 2297–2322 Bedding breccia	2287 white clay on fracture surfaces
		2312.5–2320 Core Loss		Core Loss		
		2320–2322 ALS. Phillitic shale and siltstone	2320			
		2322–2325 Core Loss		Core Loss		
		2320.5–2353.2 Siltstone. Medium grained siltstone derived from reworked Tuff. Small clusters of pyrite	2330, 2340, 2350	80, 50		2320.5–2353.2 weakly argillized siltstone with minor qtz veins. 2348 Pyrite altered marcasite in weak white clay

ANALYTICAL DATA					
FROM	TO	W	Au	Ag	Au2
2280	2285.5				
2285.5	2290				
2290	2297				
2297	2300				
2300	2305				
2305	2310				
2310	2312.5				
NO SAMPLE					
2320.5	2322				
NO SAMPLE					
2325	2330				
2330	2340				
2340	2350.5				

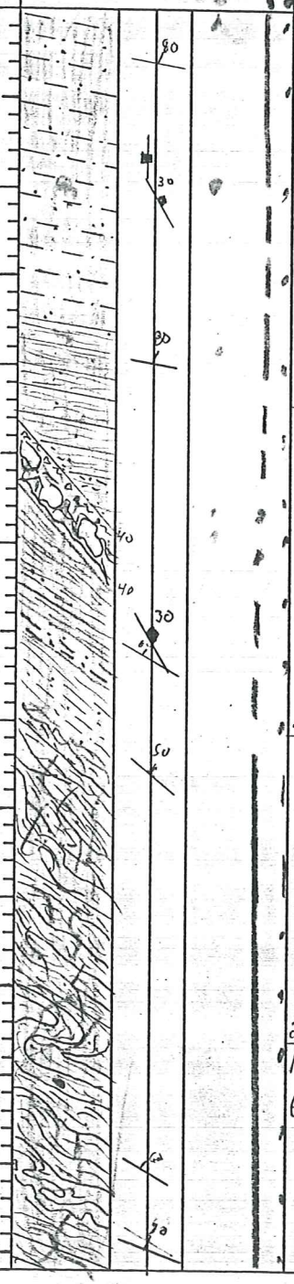
ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
ALS	R	1985.3 – 3000 ALS. ILLITIC SHALE AND SILTSTONE. 2353.2 ALS. Shale with minor siltstone beds continues to 2392. Bedding is 60° to 80° tca. Shale is highly carbonaceous metamorphic qtz masses. Pyrite is syngenetic in origin. 2407–2410 20° tca QTZ vein with open vugs	2350 2360 2370 2380 2390 2400 2410 2420		Minimal fracture cross cut bedding 2349–2354 Gradational contact between siltstone and shale	Calcite veins cross cut beds 2372 Traces of white clay 2400–2400.8 Bedded metamorphic qtz 2396 – white clay veinlet, 30° tca 2415 – white clay on 20° tca fx 2415.6 Large (1/8") syngenetic pyrite crystals	2350.5 2360 2370 2380 2390 2400 2407 2410 2415.6	2360 2370 2380 2390 2400 2407 2410 2415.6 2420.9				

HOLE NUMBER RS-475-99 PAGE 13 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
.LD.	?	1905.2 3000 A.L.S. PHILLITIC SHALE AND INTERBEDDED SILTSTONE Dark gray to black phillitic shale and medium gray siltstone 2420.9 -2423.8 metamorphic qtz with sheared shale from 2420.9 to 2422.6. Arsenopyrite crystal along margin of white metamorphic qtz. 2451.7 - 2457 siltstone interbed Bedding in interval is highly foliated and locally brecciated 2457 - 2462 Interbedded interval of thicker siltstone and shales 2469 - 2473.7 Transitional zone of increasing gray siltstone. 2473.7 - 2485.6 Tuffaceous derived siltstone. Feldspar grains still remain	2430 2440 2450 2460 2470 2480 2490		2422.7 - 2423.8 QTZ vein is cross cut by fracture at 200° tco 2431 - Bedding shifted from 40° to vert. in 1" very tight fold 2431 ¼" offsetting of calcite veins across bedding planes	Syngenetic pyrite through out the shale at 1-3% crystals up to ¼" diameter 2426-2427 white clay on fracture with quartz veinlets. Possible py/marcasite blend. 2422.7 - 2423.8 metamorphic QTZ vein with pyrite masses and traces of arsenopyrite crystal 2432 - 5" metamorphic quartz 2479 - 2485.6 white clay with Py/marcasite veinlets cross cut bedding 20° tc. 2477.8 - 2477.8 course crystaline calcite vein with white clays on fracture	2420.9 2423.8 2427 2429.2 2437.5 2444 2448 2451.7 2457 2462 2469 2473.7 2479 2485.6	2423.8 2427 2429.2 2437.5 2444 2448 2451.7 2457 2462 2469 2473.7 2479 2485.6 2495.6				

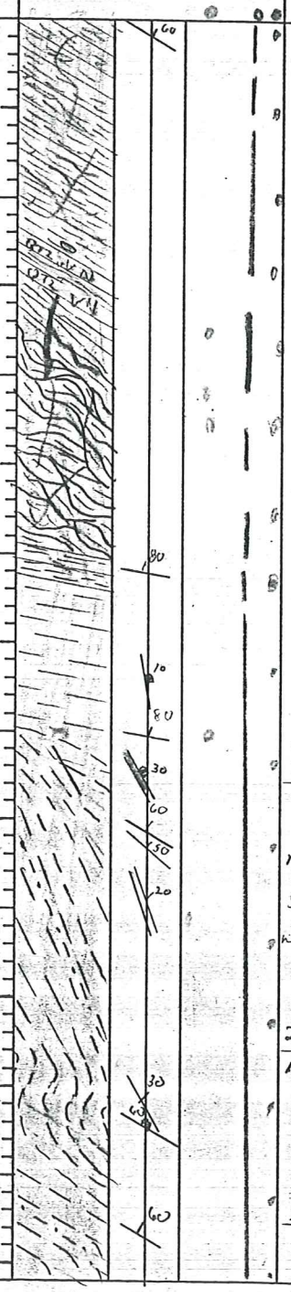
ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
ALS.	R	1785.3-3000 A.LS. PHILLITIC SHALE HAV INTERBEDDED SILTSTONE Fine grained sediments continue	2490				2485.6	2495.6				
			2500		2509 600 TCU Fx with 30° to Fx axis 2508 - 3" crushed Breccia		2495.6	2505				
			2510		2511.3-2513.6 Fault zone	2511.3-2513.6 Disseminated pyrite increases in fault to 3%	2505	2511.3				
							2511.3	2513.6				
			2520				2513.6	2520				
		2528-2529 Course siltstone reworked tuffaceous material	2530			2543.5 Bedded pyrite 1/8" thick	2520	2530				
			2540				2530	2540				
		Pino 2548 white clay				2544-2547 qtz vein with white clay traces 2547-2549 white clay on fractures	2540	2550				
			2550		2556-2561.2 Disrupted siltstone and shale with quartz veins		2550	2556				
			2560				2556	2561.2				

HOLE NUMBER RS-475-99 PAGE 15 OF 24

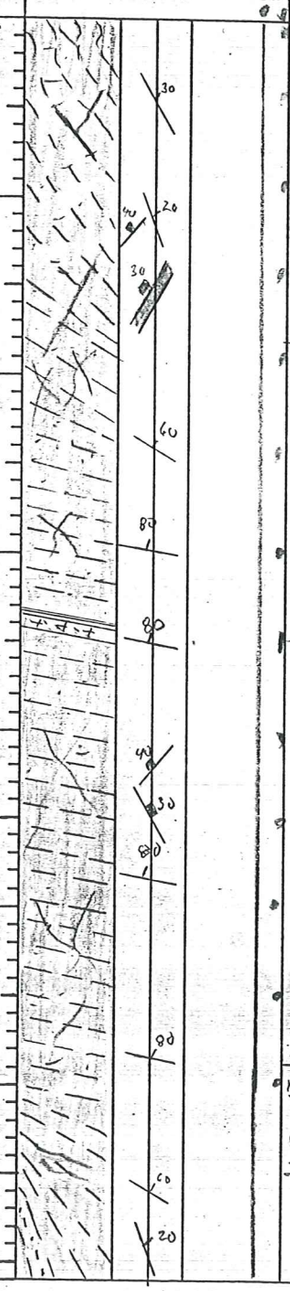
ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
ALS.	R	1985.3-3000 A.L.S. PHILLITIC SHALE AND INTERBEDDED SILTSTONE Fine grained siltstone and shales 2586.3-2590 sheared up interval of metamorphic quartz and shale. 2600.5-2609.5 stockwork of calcite and quartz veinlets. Locally spotted by white clay development 2615.4-2627 stockwork intensifies around fold. Calcite and quartz veins	2560 2570 2580 2590 2600 2610 2620 2630		2586 40° to plane with .3' of breccia above first qtz vein 2602.1 - 2609.5 Heavy qtz/calcite stockwork 2615.4-2621 Nose of a shallow fold	2602.1-2608 silicified slot in stockwork zone

ANALYTICAL DATA						
FROM	TO	W	Au	Ag	Au2	
2561.2	2570					
2570	2580					
2580	2586.3					
2586.3	2590					
2590	2594.7					
2594.7	2602.1					
2602.1	2608					
2608	2615.4					
2615.4	2621					
2621	2626.5					
2626.5	2631.5					

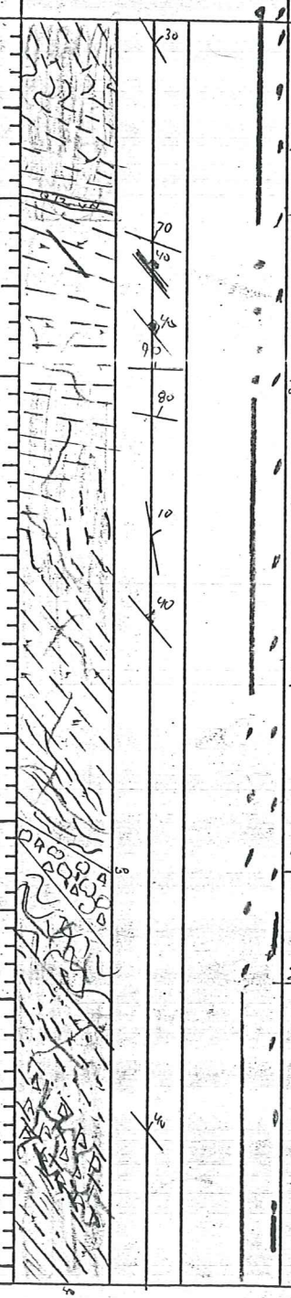
HOLE NUMBER RS-475-99 PAGE 16 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2	A
A.L.S.	R	1985.3–3000 ALS PHILLITIC SHALE AND INTERBEDDED SILTSTONE Phillitic gray black shale and medium gray siltstone 2643.1–2647.6 metamorphic qtz masses with sheared shale between individual qtz masses 2647.6–2653.6 sheared zone of shale with narrow breccias along boundarys of irregular bedding orientation 2665 shale becomes brownish gray black and phillitic texture is more obvious 2681–2682 Gray siltstone bed	2630 2640 2650 2660 2670 2680 2690 2700		2659.5 Bedding becomes generally regular and shale bedding becomes massive 2680.4–2681.4 Narrow fold 2700 steepening bedding	2643.1–2643.8 metamorphic qtz mass 2644.8–2645.9 metamorphic qtz mass 2659.5 Pyrite becomes very fine and disseminated in brownish black phillitic shale 2670 - white clay in fx's 2680.3–2680.6 Bedded metamorphic quartz from ¼" to 1" thick	2631.5 2637.1 2643.1 2647.6 2653.6 2660 2670 2680 2690	2637.1 2643.1 2647.6 2653.6 2660 2670 2680 2690 2700					

HOLE NUMBER RS-475-99 PAGE 17 OF 24

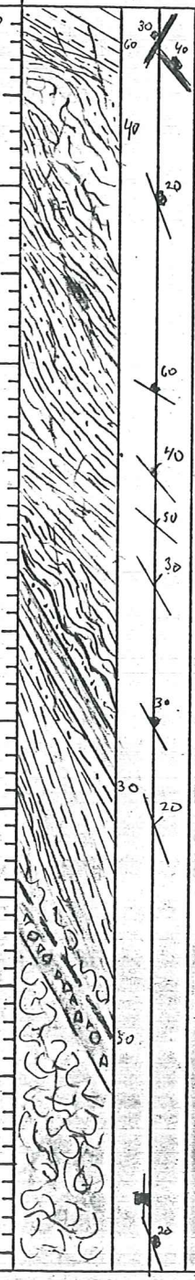
ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
ALS	R	1985.3-3000 ALS PHILLITIC SHALE AND INTERBEDDED SILTSTONE Brownish gray black phillitic texture weakly laminated shale continues. Shale is moderately calcareous and contains calcite veins metamorphic white qtz veinlets occasionally are present 2733.8-2734.5 Fine grained intrusive pale gray Footwall surface has a 1" qtz vein	2700 2710 2720 2730 2740 2750 2760 2770		2719-2722 Fracture zone 2733.8-2734.5 very sharp contacts 2763-2765 Bedding is folded from 80° to 20° to	Calcite veinlets form bladded surfaces or open fractures. 2772 2" white qtz vein or mass parallel to bedding	2700 2710 2720 2730 2733.8 2734.5 2740.5 2750.5 2761	2710 2720 2730 2733.8 2734.5 2740.5 2750.5 2761 2771				

HOLE NUMBER RS-475-99 PAGE 18 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
A.L.S.	R	1985.3-3000 A.L.S. PHILLITIC SHALE AND SILTSTONE Phillitic calcareous shale gray black shale. 2808-2814.5 calcite and quartz stock work. Bedded pyrite mass with disrupted bedding 2814.5-2840 Coarse siltstone with rework volcanic texture thin interbedded shale	2770 2780 2790 2800 2810 2820 2830 2840		2772.5-2775 Folded bedding with sharp change in rock tuff. 2797 Bedding fold 90° in 1" interval from 80° to 10° to 2795.8 3" long vug with 2816.5-2819.5 Bedded breccia 2819.5-2824.5 Contorted bedding	2787.5 open vug with large calcite crystals up to ½" diameter 2795.6-2795.9 Open vug with large calcite veins 2830-2833 Calcite healed fracture	2771 2781 2791 2800 2810 2816.5 2819.5 2824.5 2833	2781 2791 2800 2810 2816.5 2819.5 2824.5 2830 2840				

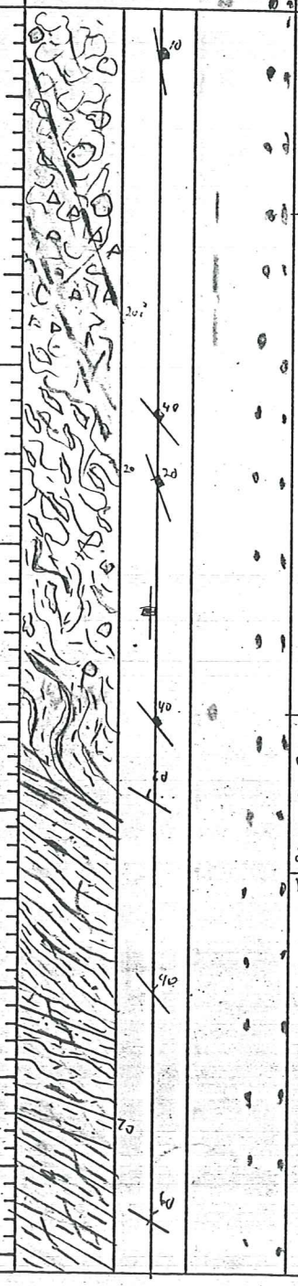
LITH.	OX/RED.	LITHOLOGY	FT.	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2	A
ALS.	R	1985.3 3000 ALS. PHILLITIC SHALE AND SILTSTONE. Interbedded shale and siltstone	2840.	40		2840.5-2840.9 Increased bedded pyrite 3-5%	2840	2850					
		Continued on page 20.	2850										

HOLE NUMBER RS-475-99 PAGE 20 OF 24

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
ALS.	R	1985.3 3000 ALS. Phillitic shale and siltstone Dark gray black shale with graphitic coating on bedding surface, medium gray coarse siltstone with beds up to 4'. Siltstone contains qtz grains making it harder than shale. Shale beds are locally highly deformed. Bedding orientations very significantly indicating local and regional folding. Thin section 2887.8 Calcite veins and carbonous beds are present. Syngenetic Pyrite forms crystals up to 1/8" in diameter and fine bedded pyrite. 2899-2903.5 Bedded qtz and shale. Beds become disrupted approaching fault breccia beginning at 2903.5 Pino 2905 w/ clyHCLT BXd Dichite 2903.5-2906.5 Highly brecciated shale with quartz fragments with white clay stringers. 2906.5-2911.3 Fracture plane 0° tca 2903.5-2940.5 Fault zone qtz/calcite stockwork fragment total bedding disruption. QTZ cuts calcite veins	2850 2860 2870 2880 2890 2900 2910 2920		2859 - bedding steepens and mini folds are seen along steep 20° tca fracture. 2863 Bedded qtz at 40° tca with calcite cross cutting 2871 60° tca fracture with 0° to fracture slicks 2884.35-2884.7 Very intense qtz calcite stockwork in shale 2884.7 2886 Increasing silica replacing siltstone bed 2886-2888.4 Sulfided banded semi translucent qtz vein, ≤5mm black sulfide rich irregular bands Parrallel Dip	Crystalline calcite coats fracture surface plus white calcite cross cuts bedding 2860-2868 silicification of surrounding shale prem 2861.5-2868 white metamorphic bedded quartz increase to 260% between 2863.5-2868, calcite veinlets and fracture coating also present. 2872-2872.5 calcite/qtz stockwork 2882-2883.5 1/4" bedded Pyrite. 2886-2888.4 Black bands of sulfide are very irregular in shape 2886-2888.4 Sulfides in vein consist of py arsenopylite, Galena and sphalerite. Possible traces of pyrargyrite and calcopyrite. Sphalerite crystal was ≤1.5mm dia. Crystal moss. Galena was in small vugs. Arsenopyrite formed bands up to 3mm. From 2888.4 Pyrite as beds and disseminations present

ANALYTICAL DATA					
FROM	TO	W	Au	Ag	Au2
2850	2854				
2854	2857.5				
2857.5	2861.5				
2861.5	2863.2				
2863.2	2866				
2866	2868.8				
2868.8	2872				
2872	2876.5				
2876.5	2879.5				
2879.5	2883.5				
2883.5	2884.7				
2884.7	2886				
2886	2888.4				
2888.4	2890.5				
2890.5	2894.5				
2894.5	2899				
2899	2901				
2901	2903.5				
2903.5	2906.5				
2906.5	2911.5				
2911.5	2915				
2915	2920				

HOLE NUMBER RS-475-99 PAGE 21 OF

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION
ALS.	R	1985.3-3000 ALS. Phillitic Shale and silt stone Fault zone continues from 2903.5 to 2940.5. Highly disrupted beds with very heavy quartz/calcite stockwork. Fracture surfaces at 0° tca. to 30° tca 2981.4-2982.4 siltstone bed with a 3" quartz vein at base of bed.	2920 2930 2940 2950 2960 2970 2980 2990		2931-2938 Milled breccia with white clay and qtz fragment, Possible shear plane of 20° tca 2960.5-2962.5 Bedded qtz at 00 tca from local folding 2976.5-2978 broken siltstone bed. Lower contact is broken	Pyrite appears syngenetic 2959.7 white clay in broken zone

ANALYTICAL DATA

FROM	TO	W	Au	Ag	Au2
2920	2924.5				
2924.5	2928				
2928	2931				
2931	2933				
2933	2938				
2938	2941.5				
2941.5	2944				
2944	2948				
2948	2951				
2951	2955				
2955	2959				
2959	2963.5				
2963.5	2965.5				
2965.5	2970.5				
2970.5	2975.5				
2975.5	2978				
2978	2981.4				
2981.4	2982.9				
2982.9	2987				
2987	2990.5				

ITH.	OX/RED.	LITHOLOGY	FT	GRAPHIC LOG	STRUCTURE	ALTERATION AND MINERALIZATION	ANALYTICAL DATA FROM	TO	W	Au	Ag	Au2
ALS.	R	1985.3-3000 ALS. Phyllitic Shale and Siltstone	2990		Bedding is becoming uniform with only minor Disruption	Narrow 1-2" silicified beds are present between calcareous bed	2990.5	2995.5				
			300				2995.5	3000				

Newmont Gold Core Form

Hole# RS-475-99
Logged by D.G. Mackerron
Date 9-30-99
Area Northwest of Mine
Coords
Az/Incl 530°E / 60°
Total Depth 300
Contractor Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite	Met.: FeOX	Met.: CO3	Met.: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
1600			Td	Rhy	Grn, Lt Gry, Gray									1600 - 1767.7 DOZER	0	1	0	0	0	1	0	0	0	1	1	1	2
														Fine chlorite filled Fractures to 1619													
1620																				0							
																2											
														1630.3 - 1631.3 Fault Breccia		1											1
1640																											
																											2
																											1
1660																											
1680																											
1700																											
																											2
														1703.2 - 1717 Fracture Zone													
1720																0				1					Tr		1
																1				0				2	1		
1740																											
																0				1				1	0		0
														1767.7 Erosional Contact at 40° to a													
1760																											
			TCS	Epcl. Sed					40					1767.7 - 1807.9 TCS EPICLASTIC SEDIMENTS	0	1	0	0	0	2	0	0	0	1	0	0	0
1780														Variable grain size sediments from claystone to conglomerate													1/0
																				1							
					Purple															0							
1800														1793 - Purple matrix Sandstone													

Newmont Gold Core Form

Hole# RS-475-99 | **Az/Incl** 530°E / 60° | **Page** 2 of 7

Logged by D.G. MacKerron | **Area** Northwest of Mine | **Total Depth** 3000

Date 10-1-99 | **Coords** | **Contractor** Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite	Met.: FEOX	Met.: CO3	Mineralogy: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
1800			TCS	clyst S.S.										1767.7 TCS. EPICLASTIC SEDIMENTS	0	1	0	0	0	0	0	0	0	1	0	1	0
				Rhy. Porphy	Purple Brown				30							0								Tr			
1820														1807.9 - TCS Rhyolite Porphyry 1892.4													
														Biotite and feldspar Porphyry													
1840																1				1						1	
																				0						0	
																				1							
1860																											
																				0						1	
1880																								1			
				EPI. SEDS.	Green									1892.4 - 1896.5 TCS Epiclastic sandstone in fault zone.		2				1				3			
1900				Rhyo. Porph	Purple Brown				30															1			
														1896.5 - 1923.4 Course phorphyry		1											
1920																										0	
				Biotite Rhyo Porphy	Pale Pink				30					1925.1 - 1963.8 Fine Biotite rhyolite porphyry High biotite content		0				0				Tr			
1940																											
1960				Clyst S.S.		Purple brn			20					1963.8 TCS CLAYSTONE AND SANDSTONE										0			
1980				ALS	Shale	Black			60					1985.3 - 3000 ALS. Phillitic Shale and Siltstone	1	1						2	2		2	
														1985.3 - 2013 sheared zone		0								1			

Newmont Gold Core Form

Hole# RS-475-99 **Az/Incl** S 30° E / 60°

Logged by D.G. MacKerron **Area** Northwest of Mine **Total Depth** 3000

Date 10-2-99 **Coords** **Contractor** Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite		Met.: FEOX	Met.: CO3	Mineralogy: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
2000			ACS	Shale	Black									1985.3-3000 ACS Phyllitic Shale AND Siltstone	1	0	0	0	0	0		0	1	0	1	0	2	0
																1												
																0												
									40					2013 Disruption below contact ends	0								3					
2020																												
2040																												
2060																												
2080																												
2100															0	2											0	4
2120																												
2140																												
2160																												
														2180 - 2194.8 Bedding fault														
2180									40																			
									80																			
2200																												

Newmont Gold Core Form

Hole# RS-475-97
Logged by D.G. Macherro
Date 10-4-97
Area Northwest of Mine
Coords
Az/Incl S 30°E/60°
Total Depth 3000
Contractor Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite	Alteration:	Met.: FeOX	Met.: CO3	Met.: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
2200			ALS	Shale	Blk									1985.3-3000 A.L.S. PHILLITIC SHALE AND SILTSTON	0	0	0	0	0	0		0	3	0	1	0	2	0
2220																												
2240														2214 - 2229.7 Sheared metamorphic qtz and calcite.														
														2241.3 - 2244.6 Bedding shear														
2260														2251 - 2261.2 Bedding shear with metamorphic qtz masses														
2280														2272 - 2277 Irregular spaced bedding shear														0
2300														2297 - 2320.5 Bedding Shear/Fault zone														
2320				Siltst.	Gray											1												
2340																												0
				Shale	Black											0												
2360																												0
2380																												
2400																												1

Newmont Gold Core Form

Hole# RS-475-99 **Az/Incl** S 30°E / 60° **Page** 5 of 7

Logged by D G Mackenzie **Area** Northwest of Mine **Total Depth** 3000

Date 10-4-99 **Coords** **Contractor** Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite	Met.: FEOX	Met.: CO3	Met.: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
2400			ALS	Shale Siltst	Blk Gray									1985.3-3000 ALS. SHALE AND SILTSTONE	0	0	0	0	0	0	0	3	0	1	0	1	0
														2407-2410 20° TCA qtz vein													
2420														2422.6 Arsenopyrite crystals on edge of metamorphic qtz vein 2420.9-2423.8	1 / 0							2		Tr / 0 / Tr / 0		
2440														2451.7-2457 Highly foliated siltstone interval													1 / 0
				SILTSTONE																							
2460				Shale Siltst.																							1 / 0
				Siltst.																							
2480																											1
				Shale Siltst																							0
2500														2511.3-2513.6 Fault zone		1 / 0											
									40																		
2520																											
2540				Siltst.																							
														2556-2558 Fault zone	1	1 / 0										
2560				Shale					70																		
2580				Chlorite										2586-2590 metamorphic qtz and sheared shale	1	1 / 0										
2600																											

Newmont Gold Core Form

Hole# RS-475-98
Logged by D. G. Mackenzie
Date 10-12-98
Area Northwest of Mine
Coords
Az/Incl S 30°E / 60°
Total Depth 3000
Contractor Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop	Alteration: Sericite	Alteration: Chlorite	Met.: FEOX	Met.: CO3	Met.: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
2600			ALS	Shale	Black									1985.3-3000 ALS. Ahillitic shale and siltstone	2	0	0	0	0	0	0	1	0	1	0	1	0
															1											3	
															0							3				1	
														2602.1-2609.5 qtz/calcite stockwork	1							2				3	
2620																											
														2615.4-2621 Two folds with very shallow axis (30° to u)								3				1	
																						1					
2640																						3					
														2615.4-2626.5 qtz/calcite stockwork	1							0					
															1							2				2	
2660														2643.1-2643.8 metamorphic qtz								1					
																						3				1	
														2645.3-2646 metamorphic quartz													
2680														2659.5 Weakly laminated brownish gray black shale dominates lithology													
2700																											
2720																						2					
														2733.8-2734.5 Fine grained intrusive								3					
2740																											
2760																											
2780																						1				2	
																						3					
2800																											

Newmont Gold Core Form

Hole# RS-475-99 **Az/Incl** S30°E /60°

Logged by D. G Macherron **Area** Northwest of Mine **Total Depth** 3000

Date 9-16 **Coords** **Contractor** Longyear

Footage	% Rec	RQD	Litho: Formation	Litho: Rock type	Litho: Color	Au oz/st	Ag oz/st	Graphic	Structure: Attitudes	Structure: fault	Structure: breccia	Structure: vein	Structure: gouge	Comments	Alteration: Silic	Alteration: argillic	Alteration: clay	Alteration: prop.	Alteration: Sericite	Alteration: Chlorite	Alteration:	Met.: FeOX	Met.: CO3	Mineralogy: Sulfide	Mineralogy: Pyrite	Mineralogy: Marcasite	Mineralogy: Calc/Dolo	Mineralogy: Clay
2800			ALS	Slate Siltst	Black & Gray									1985.3-3000 ALS PHILLITIC SHALE AND SILTSTONE	0	0	0	0	0	0		0	3	0	1	0	1	0
																											2	
																							1					
																											3	
2820																												
																							2				2	
																							3				3	
																							1				1	
2840																												
																							3					
																							1			1	0	
2860																												
															1													
															3													
														2863.2 - 2866	Tr								0					
														Bedded white quartz	1													
2880														2866 - 2872 Gray coarse	2													
														siltstone	3													
															1													
															Tr												Tr	
														2877 - 2877.5	1												0	
														qtz/cal stockwork in shale														
2900															2												1	
														2883.5 - 2884.7		3												
														qtz/cal stockwork in shale	3	0											
																											0	
														2884.7 - 2886														
														qtz stockwork in siltstone													Tr	
2920																												
														2886 - 2888.4 sulfide													0	
														Banded veins sulfide	2	1											Tr	
														bands to 1.5m thick	1	2											1	
														Bands are irregular in		3												
2940														shape. Dip is 30° to	2	0											0	
														Arsenopyrite, sphalerite,	1													
														Galena														
														2903.5 - 2906.5 milled Bxo														
2960														2906.5 - 2923 Intense		1 0											1	
														stockwork													0	
														2923 - 2931 moderate stockwork														
														2931 - 2938 milled Bxo														
2980														with white clay and qtz													1	
														bxo fragments.													D	
															Tr								Tr					
3000														TD 3000														

Hecla MINING COMPANY

ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 1 OF 16
DATE 8/20/99
LOGGED BY KJA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH S 30°E
INCLINATION -60°

AREA NW TARGET AREA
DRILLING CO. EKLUND
RIG TYPE RUC
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	15%	+25%	MATRIX %	CLASTS %	ARGILLIC 5%	15%	+25%	TYPE	PROPYLITIC % CHLORITE	CALCITE	H-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	15%	+25%	VIENING %	TYPE	MINERALIZATION: SULFIDES 5%	15%	+25%	PY %	CPY %	MAR %	X-SUL %	SILVERITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
5		Colluvium	Colluvium - clasts are monolithic consisting of a fine-grained slightly porphyritic rock w/ microphenocrysts of Hematite Replaced Hornblende. (Fe Mag. Flow.)	MS MH	Clasts are SP																																				
30		TC Plag/±Sm	Porphyritic unit w/ common chloritically or with clay altered Plagioclase phenos unit may contain rare sandstones	MH	P																																				
60		TC FeMag	Same unit as above w/ large increase in Hematite replaced Hornblende. Phenocrysts of chloritically and white clay alt Plag. ± sandstone. Rare looks like FeMag flow in places.	MH	A-SP																			Tr	CaCO3 +Mn																

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

Hecla MINING COMPANY

ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 2 OF 16
DATE 8/20/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MASSIVE %	SILICIFICATION QUARTS %	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	K-SLF %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
105		TC FeMag		MH	SP																																				
110																																									
115																																									
120		TC FeMag AutoBx	SAME UNIT AS ABOVE only Auto BRECC 115-145' unit is BLEACHED w/t Silica veinlets.	MS-MH	SP	1						X		Bleaching						X		1-2	SiO2										X								
125						1						X								X		1-2											X								
130			Possible Structural Zone Controlled Alt			1						X								X		1-2											X								
135						1						X								X		1-2											X								
140						1						X								X		1-2											X								
145											X								X			1											X								
150				MH																																					
155																																									
160																																									
165																																									
170																																									
175																																									
180																																									
185																																									
190			Possible Structure	MS-MH		1					X			Bleach					X			1	SiO2										X								
195		TC FeMag	SAME AS ABOVE - only NOT Auto Bx'd	MH	SP																																				
200																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 3 OF 16
DATE 8/20/99
LOGGED BY KAB
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MATRIX %	SILICIFICATION CLASTS %	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	X-SUL %	SULFATE %	BARITE %	METALLURGY: OXIDE	SULF	OXIDION	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
205		TC Fe-Mag	SAME AS ABOVE	MH	SP																																				
210				MH	SP																																				
215	Possible Structure		Bleached w/common Lt green clay filled fractures ± SiO2	MH-MS	SO	1						X		Bleach	+/-							2-4	Lt green clay ± SiO2	TR																
220						1						X			+/-									TR																	
225						1						X			+/-									TR																	
230				MH																																					
235																																									
240																																									
245																																									
250																																									
255																																									
260																																									
265																																									
270	Possible Structure		Bleached w/ sulfide & ± SiO2 stockwork	MS-MH	SP						X			Bleach								1-2	SiO2 + Sulf	1			X														
275						1					X											1-2		1			X														
280			@ 275-280 - Some of the pyrite has Replaced SiO2-Coated Marcasite Blades			1					X											2		2			X		X													
285			@ 280-285 - MINOR Vuggy silica	MH		4					X											5		4			X															
290				MH		4					X											5		4			X														
295		TC Fe-mag	Possible increase in SAMARINE phenos - Could this be RQK?	MH																																					
300																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 4 OF 16
DATE 8/20/97
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MAGRS %	SILICIFICATION QUARTS %	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	AG-SUL %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	OXIDEON	MOCURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
305		TC FeMag	Continuing Fe-Mag Flow TC w/ micro phenocrysts of Hematite Replacing Hornblend.	M-H	SP																																				
310																																									
315																																									
320																																									
325																																									
330																																									
335																																									
340																																									
345																																									
350																																									
355																																									
360																																									
365																																									
370																																									
375																																									
380																																									
385																																									
390																																									
395																																									
400																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 5 OF 16
DATE 8/20/90
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION																	MINERALIZATION									METALLURGY				ANALYTICAL DATA				
						SILICIFICATION					ARGILLIC				PROPYLITIC %		POTASSIC %		OXIDATION			VIENING	SULFIDES			PY	CPY	MAR	XC-SLF	SFLENTE	BARITE	OXIDE	SULF	CARBON	MOGUE	FROM	TO	W	Au	Ag
						5%	15%	+25%	MAGS	QUARTS	5%	15%	+25%	TYPE	CHLORITE	CALCITE	K-SPAR	ALUNITE	5%	15%	+25%	%	TYPE	5%	15%	+25%	%	%	%	%	%	%										
405		TC FeMag	SAME AS ABOVE	MH	SP																																				
410																																									
415																																									
420																																									
425																																									
430																																									
435																																									
440																																									
445																																									
450																																									
455																																									
460																																									
465																																									
470																																									
475																																									
480																																									
485																																									
490																																									
495																																									
500																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 6 OF 16
DATE 8/20/99
LOGGED BY KAA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MASSIVE	SILICIFICATION QUARTZ	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	AS-SUL %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOLYBDE	ANALYTICAL DATA: FROM	TO	W	Au	Ag
505		TC FeMag	SAME AS ABOVE	MH	SP																																				
510																																									
515																																									
520																																									
525																																									
530																																									
535																																									
540																																									
545																																									
550																																									
555		Bleached TC Femag	Same unit as above - Bleached w/ minor SiO2. plag phenos are chloritically alt. & Hematite replaced Hornblende is not identifiable. Minor pyrite	MH	SP	1					X			Bleach								1	SiO2	1																	
560						1					X											1		1																	
565						1					X											1		1																	
570						1					X											1		1																	
575						1					X											1		1																	
580		TC FeMag		MH	SP																																				
585																																									
590																																									
595																																									
600																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER 05-475
PAGE 7 OF 16
DATE 8/20/99
LOGGED BY KAA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MAJOR %	SILICIFICATION QUARTZ %	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	AS-SULF %	SILBENITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
605		TC FeMag	Same As Above "Hematite Replaced Hornblende microphenocrysts ± plag ± Sanidine	MH	SP																																				
610																																									
615																																									
620																																									
625																																									
630																																									
635																																									
640																																									
645																																									
650																																									
655																																									
660																																									
665																																									
670																																									
675																																									
680																																									
685																																									
690		TC FeMag	Minor Bleaching ± Sio2 ± Pyrite	MH	SP	1					1													1			Py														
695						1					1													1			Py														
700						1					1													1			Py														

Hecla MINING COMPANY

ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 8 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MAGS	SILICIFICATION CLASTS	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	AG-SULF %	SULFATE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	Au	Ag
705		TC?	Fine-grained, hematitic mud?	MS	FG																																				
710		TC Fe-Mag?	Slightly porphyritic w/chloritically alt plag phenos	MH	SP	1					1					1						1	CaCO3	1			Py														
715				MH	SP	1					1					1						1		1																	
720		TC Fe-Mag	Fg-Slightly porphyritic unit w/ abundant small Hematite Replaced Hornblende microphenocrysts	MH	SP											TR																									
725																TR																									
730																TR																									
735																TR																									
740																TR																									
745		TC Vesicular mottled Flow	Fg-porphyritic vesicular or mottled flow vesicles are filled w/ Hematite or a light-Green Clay. phenocrysts are dominantly Hematite Replaced meso-phenos + Clay Alt microphenos													1						1	CaCO3																		
750																1						1																			
755																TR																									
760																TR																									
765																TR																									
770		TC Fe-mag	Bleached Fg-slightly porphyritic w/ chloritically alt plag phenos	MH	SP											TR								1			Py														
775																TR								1			Py														
780																TR								1			Py														
785		TC Fe-mag	Fg-Slightly porphyritic Hematite Replaced Hornblende microphenos Liesegang Banded w/ FeOx.	MH	SP-FG																																				
790																																									
795																																									
800																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 9 OF 16
DATE 8/23/99
LOGGED BY KJ
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MASSIVE	SILICIFICATION CLASTS	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % KLINITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VEINING %	VEINING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	KC-SULF %	SULFATE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
805		TC Fe-Mag	Fg. Slightly Porphyritic, Hematite Replaced Hornblend Microphenocrys w/ Lineagong. Banded Fe Ox.	MH	SP																																				
810																																									
815																																									
820																																									
825																																									
830																																									
835																																									
840			Same As Above - only Auto Bx'd & Bleached	MH							1													1			Py													
845											1													1																
850			SAME AS ABOVE	MH							1													1																
855																																									
860																																									
865																																									
870																																									
875																																									
880			SAA	MH							1													1			Py													
885											1													1																
890			SAA	MH																																					
895																																									
900																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 10 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	15%	+25%	MAGN %	QUARTZ %	ARGILLIC 5%	15%	+25%	TYPE	PROPYLITIC % CHLORITE	CALCITE	POTASSIC % K-SPAR	ALUNITE	OXIDATION 5%	15%	+25%	VEINING %	TYPE	MINERALIZATION: SULFIDES 5%	15%	+25%	PY %	CPY %	MAR %	K-SLF %	SILVERITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
905		TC Fe-Mag	Fg-Sp Hematite Replaced Hornblende Microphenocrysts. w/ Liesegang Banding	MH	SP																																				
910																																									
915																																									
920																																									
925																																									
930																																									
935																																									
940																																									
945																																									
950																																									
955																																									
960		TC Fg. Mud matrix?	Fine-Grained very slightly porphyritic. Hes. unit. Has. no. or very little Hematite Replaced Hornblende Microphenocrysts. Looks like the muddy matrix of various breccias in the Chocolate or Badger Formations	MS-MH	FG																																				
965																																									
970																																									
975																																									
980																																									
985																																									
990																																									
995																																									
1000																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 11 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	15%	+25%	MATRIX %	QUARTS %	ARGILLIC 5%	15%	+25%	TYPE	PROPYLITIC % CHLORITE	CALCITE	POTASSIC % K-SPAR	ALUNITE	OXIDATION 5%	15%	+25%	VIENING %	TYPE	MINERALIZATION: SULFIDES 5%	15%	+25%	PY %	CPY %	MAR %	K-SLF %	SILBNITE %	BARITE %	METALLURGY: OXIDE	SULF	OXIDON	MCGURE	ANALYTICAL DATA: FROM	TO	W	Au	Ag
1005		TC Fg-MUD MATRIX	SAA	MS-MH	Fg																																				
1010																																									
1015																																									
1020																																									
1025																																									
1030																																									
1035																																									
1040																																									
1045		TC Fe-MAG	Slightly porphyritic w/ Abundant Hematite Replaced Hornblende microphenocrysts	M4	SP																																				
1050																																									
1055																																									
1060			SAA only Bleached			TR					1													TR			Py														
1065		TC Ferring Auto Bx	SAA w/ Auto Bx'tion																																						
1070																																									
1075																																									
1080																																									
1085																																									
1090																																									
1095																																									
1100																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 12 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MASS	SILICIFICATION QUARTZ	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	AS-SULF %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	Au	Ag
1105		TC Fe-Mag Auto Bx	SAA	MH	SP																																				
1110																																									
1115																																									
1120																																									
1125																																									
1130																																									
1135																																									
1140			SAA - Bleached ± propylitization ± SiO2			1																		1																	
1145						5																		1																	
1150							X				1													2																	
1155		FAULT	FAULT - Propylitized gouge	S-MS								X												1																	
1160		FgTC? Td? LBT?	Fine-grained, non-porphyritic, unit. Could be Dacer or LBT unit.	MH	Fg																																				
1165																																									
1170																																									
1175																																									
1180																																									
1185																																									
1190																																									
1195																																									
1200																																									

Hecla MINING COMPANY

ROSEBUD PROJECT
DRILL LOG

HOLE NUMBER RS-475
PAGE 13 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MAGGS %	SILICIFICATION QUARTS %	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	K-SLF %	SULFATE %	BARITE %	METALLURGY: OXIDE	SULF	OXIDE	MIXED	ANALYTICAL DATA: FROM	TO	W	Au	Ag
1205		Fg Td? LST? FgTc?	Fine-grained, Non-porphyritic;	MH	Fg																																				
1210						X					X											TR	Qtz																		
1215						X					X											TR	Qtz																		
1220			INCREASED SiO2 Flooding & stockwork some chips look like SiO2 HEALED HydRO-ex's. w/ Common Marcasite blades Replaced By Pyrite	H			X				X											5	QTZ	2-3			X		X												
1225							X				X											5	QTZ	2-3			X		X												
1230							X				X											5	QTZ	2-3			X		X												
1235				MH		X					X											2		1			X		X												
1240						X					X											2		1			X		X												
1245				H			X				X											5		1			X		X												
1250				MH		X					X											2		1			X		X												
1255						X					X											1		1			X		X												
1260						X					X											1		1			X		X												
1265						X					X											1		1			X		X												
1270						X					X											1		1			X		X												
1275						X					X											1		1			X		X												
1280						X					X											1		1			X		X												
1285						X					X											1		1			X		X												
1290						X					X											1		1			X														
1295						X					X											1		1			X														
1300						X					X											1																			

Hecla MINING COMPANY

ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 14 OF 16
DATE 8/23/99
LOGGED BY KDA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	15%	+25%	MAGS	CLASTS	ARGILLIC 5%	15%	+25%	TYPE	PROPYLITIC % CHLORITE	CALCITE	POTASSIC % K-SPAR	ALUNITE	OXIDATION 5%	15%	+25%	VIENING %	TYPE	MINERALIZATION: SULFIDES 5%	15%	+25%	PY %	CPY %	MAR %	AS-SULF %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOISTURE	ANALYTICAL DATA: FROM	TO	W	Au	Ag
1305		Fg TC > Fg Td > Fg LBT	SAA - Sulfides ARE Fine-Grained & commonly ARE Pyrite After MARCASite.	MH	FG	X					X													1			X		X												
1310						1					X													1			X													
1315						1					X													1			X													
1320						1					X													1			X													
1325						1					X													1			X													
1330						1					X													1			X													
1335						1					X													1			X													
1340						1					X													1			X													
1345						1					X													1			X													
1350						1					X					1%								2-3			X													
1355						1																		1			X													
1360						1																		1			X													
1365						1					X													1			X													
1370						X					1													2-3			X													
1375				H		X					1													1			X													
1380						X					1													1			X													
1385							X				1													1			X													
1390							X				1													1			X													
1395							X				1													1			X													
1400				MH		X					1													1		÷	X													

Hecla MINING COMPANY

ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 15 OF 16
DATE 8/23/99
LOGGED BY KAA
TOTAL DEPTH 1600

LOCATION
NORTHING
EASTING
ELEVATION
AZIMUTH
INCLINATION

AREA
DRILLING CO.
RIG TYPE
HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	SILICIFICATION 15%	SILICIFICATION +25%	SILICIFICATION MASSIVE	SILICIFICATION QUARTZ	ARGILLIC 5%	ARGILLIC 15%	ARGILLIC +25%	ARGILLIC TYPE	PROPYLITIC % CHLORITE	PROPYLITIC % CALCITE	POTASSIC % K-SPAR	POTASSIC % ALUNITE	OXIDATION 5%	OXIDATION 15%	OXIDATION +25%	VIENING %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	SULFIDES 15%	SULFIDES +25%	PY %	CPY %	MAR %	K-SPAR %	SILENITE %	BARITE %	METALLURGY: OXIDE	SULF	CARBON	MOLYBDE	ANALYTICAL DATA: FROM	TO	W	AU	AG
1405		Fg TC? Fg TR? Fg LBT?	SAA	MH		-					X													1			X														
1410				MH		X					X													1			X														
1415						X					X													1			X														
1420						X					X													1			X														
1425						X					X													1			X														
1430						X					X													1			X														
1435				H			X				X													1			X														
1440				MH		X					X													3			X		X												
1445						X					X													1			X														
1450						X					X													1			X														
1455						X					X													1			X														
1460						X					X													1			X														
1465						X					X													1			X														
1470						X					X													1			X														
1475		?C? Fe-mag Fl/BX	Fg Fe-mag Flow or Dike?	MH																																					
1480		Fg Auto BX LBT?	LOOKS LIKE AUTOBRECCIATED VOLCANIC OR POSSIBLY PART OF EPICLASTIC UNIT. "this could be the Lower PINK MATRIX BX. that sits on top of TOS IN the MINE AREA.			X					X											1	White Clay	1			X														
1485						X					X											1		1			X														
1490						X					X													1			X														
1495						X					X													1			X														
1500						X					X													1			X														

Hecla Mining Company
ROSEBUD PROJECT DRILL LOG

HOLE NUMBER RS-475
PAGE 16 OF 16
DATE 8/23/99
LOGGED BY [illegible]
TOTAL DEPTH 1600

LOCATION
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HOLE SIZE
DOWN HOLE SURVEY BY

FEET	GRAPHIC	ROCK TYPE	LITHOLOGY	HARDNESS	TEXTURE	ALTERATION: SILICIFICATION 5%	15%	+25%	MAGR %	QUARTS %	ARGILLIC 5%	15%	+25%	TYPE	PROPYLITIC % CHLORITE	CALCITE	K-SPAR	ACTINOLITE	POTASSIC % 5%	15%	+25%	OXIDATION %	VIENING TYPE	MINERALIZATION: SULFIDES 5%	15%	+25%	PY %	CPY %	MAR %	AS-SULF %	STIBNITE %	BARITE %	METALLURGY: OXIDE	SULF	OXIDE/SULF	MIXTURE	ANALYTICAL DATA: FROM	TO	W	AU	AG
1505		Fg Auto BX LBT	SAA	MH		1					X													1																	
1510		TOS	Bud-Like Epiclastic w/strong volcanic component. There ARE several, but RARE clasts of RJR ALS phyllite clasts which INDICATE THIS IS TOS! If this is TOS - then from 1155 - 1505 would be LBT!	MH	clastic						X													TR																	
1515				MH							X													TR																	
1520				MS-MH							X				X									TR																	
1525											X				X									TR																	
1530											X				X									TR																	
1535											X				X									TR																	
1540											X				X									TR																	
1545											X				X									TR																	
1550											X				X									TR																	
1555											X				X									TR																	
1560											X				X									TR																	
1565											X				X									TR																	
1570											X				X									TR																	
1575											X				X									TR																	
1580											X				X									TR																	
1585											X				X									TR																	
1590											X				X									TR																	
1595		Fault	Fault	S								X			X										X																
1600		FG DOPER	Fine-Grained, propylitized. DOPER	MS	Fg						X				X									X																	
											X				X									X																	

BARRINGER LABORATORIES, INC.

RENO, NEVADA, U.S.A., 5301 Longley Lane, Bldg. E, Reno, NV, 89511, TEL: 702-828-1158, FAX: 702-828-1263

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Durango, Durango, Mexico C.P. 34030
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Avenida Domingo Orué 489
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Calle 80 Sur N. 47D-65, L-106
Sabaneta, Colombia
TEL (574) 301-0704

BARRINGER LABORATORIOS de MEXICO, S.A. de C.V.
Blvd. García Morales 829-A, Bodega #2
Colonia La Manga
Hermosillo, Sonora, Mexico C.P. 83210
TEL/FAX (011-52-6) 261-0415

BARRINGER LABORATORIES NICARAGUA
COMPLEJO OCAL
Km 7.5 Carretera Norte
Managua, Nicaragua
TEL (011-50-5) 883-0778

McCLELLAND/BARRINGER LABORATORIOS HONDURAS
Kilometro 5,
Boulevard Suyapa
Tegucigalpa, M.D.C., Honduras
TEL (011-50-4) 231-1841

Work Order # _____
Date Received _____
Purchase Order # _____
Project # _____
Date Shipped 10-20-99
Shipped Via _____
# of Cartons _____
# of Samples 220 + 3 pulps

Geochemical Laboratory Instruction Sheet

Copy of Results:	Results And Invoice To:
Kurt Allen : Rosebud Mine	Charlotte Bolton
Fax # 1-775-623-0967	Newmont Gold
Randy Vance : Newmont Gold	861 N 6th St. Winnemucca NV
861 N 6th Street	89445
Winnemucca NV 89445	AUTHORITY:

No. of Samples	Sample Type	List of Sample Numbers	Elements Requested
220	core	RS-475-99	Au Ag Use Rosebud
		See attachment for sample interval	Mine development factors
			NVC 30 element ICP
			Partial digestion
			Composite as shown
			on attachment
3	Pulps	standards: 1807.9B, 2067.4B, 2631.5B	Au fat fusion
			Au Ag Nb ICP

RS-475-99
MS-3
(RMG1)
1807.9B

PEEL HERE

RS-475-99
G01 - 52
G01 - 52
2067.4B

PEEL HERE

RS-475-99
MS-2
(RMG1)
2631.5B

COARSE REJECTS/PULPS

- [x] Return/collect after analysis
- [ ] Return/collect after 30 days
- [ ] Discard after 30 days

IF NOT MARKED, REJECT DISCARDED AFTER 30 DAYS

PULP (Free storage for 6 months)

- [x] Return/collect after analysis
- [ ] Return/collect at 6 months
- [ ] Discard at 6 months

IF NOT MARKED, PULP IS DISCARDED AFTER 6 MONTHS

COARSE REJECTS/PULPS WILL BE DISCARDED UNLESS OTHERWISE REQUESTED

- [ ] Fire Assay/Gravimetric
- [ ] NaCN/A.A.

RESULTS REPORTED IN:
- [ ] ppb
- [ ] PPM
- [x] oz/T
- [ ] grams/T

TRACE ELEMENT METHOD
- [ ] Wet Chem./A.A.
- [ ] Wet Chem./ICP

RESULTS REPORTED IN:
- [ ] ppm
- [ ] Percent %
- [x] oz/T
- [ ] grams/T

ADDITIONAL INSTRUCTIONS:
In two shipments 10/20 & 10/21

NOV96:PM5:RENO3:GEOCHEM

RS-475-99

Depth From	To	Interval	Au	Ag	ICP	Composite Interval	Sample Number
1600	1603	3	x	x			1
1603	1607	4	x	x			2
1607	1612	5	x	x			3
1612	1616.5	4.5	x	x			4
1616.5	1618.9	2.4	x	x			5
1618.9	1623	4.1	x	x			6
1623	1626.5	3.5	x	x			7
1626.5	1628.8	2.3	x	x			8
1628.8	1631.3	2.5	x	x			9
1631.3	1636	4.7	x	x			10
1636	1639.1	3.1	x	x			11
1639.1	1642	2.9	x	x			12
1642	1646.5	4.5	x	x			13
1646.5	1649.5	3	x	x			14
1649.5	1654	4.5	x	x	x	54	15
1654	1657.8	3.8	x	x			16
1657.8	1662.5	4.7	x	x			17
1662.5	1667.5	5	x	x			18
1667.5	1672.8	5.3	x	x			19
1672.8	1678	5.2	x	x			20
1678	1683.2	5.2	x	x			21
1683.2	1688.5	5.3	x	x			22
1688.5	1692.5	4	x	x			23
1692.5	1697.5	5	x	x			24
1697.5	1703.2	5.7	x	x			25
1703.2	1707.5	4.3	x	x			26
1707.5	1712	4.5	x	x			27
1712	1717	5	x	x	x	63	28
1717	1722	5	x	x			29
1722	1727	5	x	x			30
1727	1733	6	x	x			31
1733	1737	4	x	x			32
1737	1742.5	5.5	x	x			33
1742.5	1747.5	5	x	x			34
1747.5	1749.5	2	x	x			35
1749.5	1753	3.5	x	x			36
1753	1758	5	x	x			37
1758	1763	5	x	x			38
1763	1767.7	4.7	x	x	x	50.7	39

1767.7	1772.7	5	x	x			40	
1772.7	1776.1	3.4	x	x			41	
1776.1	1779	2.9	x	x			42	
1779	1784.5	5.5	x	x			43	
1784.5	1789.5	5	x	x			44	
1789.5	1793	3.5	x	x			45	
1793	1797	4	x	x			46	
1797	1800	3	x	x			47	
1800	1803.1	3.1	x	x			48	
1803.1	1807.9	4.8	x	x	x	40.2	49	1807.9B
1807.9	1813	5.1	x	x			50	
1813	1820	7	x	x			51	
1820	1830	10	x	x			52	
1830	1838.3	8.3	x	x			53	
1838.3	1843.7	5.4	x	x			54	
1843.7	1846.7	3	x	x			55	
1846.7	1851.1	4.4	x	x			56	
1851.1	1856.3	5.2	x	x			57	
1856.3	1860	3.7	x	x	x	52.1	58	
1860	1870	10	x	x			59	
1870	1880	10	x	x			60	
1880	1885.3	5.3	x	x			61	
1885.3	1888	2.7	x	x			62	
1888	1890.5	2.5	x	x			63	
1890.5	1892.4	1.9	x	x			64	
1892.4	1896.5	4.1	x	x	x	36.5	65	
1896.5	1903.5	7	x	x			66	
1903.5	1909	5.5	x	x			67	
1909	1914	5	x	x			68	
1914	1919	5	x	x			69	
1919	1923.4	4.4	x	x			70	
1923.4	1925.1	1.7	x	x	x	28.6	71	
1925.1	1930	4.9	x	x			72	
1930	1934.5	4.5	x	x			73	
1934.5	1939.5	5	x	x			74	
1939.5	1945	5.5	x	x			75	
1945	1955	10	x	x			76	
1955	1960.4	5.4	x	x			77	
1960.4	1963.8	3.4	x	x	x	38.7	78	

1963.8	1967.7	3.9	x	x			79	
1967.7	1972	4.3	x	x			80	
1972	1976.5	4.5	x	x			81	
1976.5	1980	3.5	x	x			82	
1980	1985.3	5.3	x	x	x	21.5	83	
1985.3	1987	1.7	x	x			84	
1987	1991	4	x	x			85	
1991	1994.5	3.5	x	x			86	
1994.5	1997	2.5	x	x			87	
1997	2001	4	x	x			88	
2001	2005	4	x	x			89	
2005	2008	3	x	x			90	
2008	2013	5	x	x	x	27.7	91	
2013	2017	4	x	x			92	
2017	2022	5	x	x			93	
2022	2028	6	x	x			94	
2028	2033	5	x	x			95	
2033	2037.5	4.5	x	x			96	
2037.5	2042	4.5	x	x			97	
2042	2050	8	x	x			98	
2050	2060	10	x	x			99	
2060	2067.4	7.4	x	x	x	54.4	100	2067.4B
2067.4	2070.3	2.9	x	x			101	
2070.3	2075	4.7	x	x			102	
2075	2081	6	x	x			103	
2081	2087.5	6.5	x	x			104	
2087.5	2095	7.5	x	x			105	
2095	2099	4	x	x			106	
2099	2107.5	8.5	x	x			107	
2107.5	2115	7.5	x	x	x	47.6	108	
2115	2124	9	x	x			109	
2124	2129	5	x	x			110	
2129	2134	5	x	x			111	
2134	2140	6	x	x			112	
2140	2150	10	x	x			113	
2150	2156.6	6.6	x	x			114	
2156.6	2160	3.4	x	x			115	
2160	2165	5	x	x		50	116	

2165	2170.5	5.5	x	x			117
2170.5	2175.5	5	x	x			118
2175.5	2180	4.5	x	x			119
2180	2185	5	x	x			120
2185	2190	5	x	x			121
2190	2194.8	4.8	x	x			122
2194.8	2199.5	4.7	x	x			123
2199.5	2207	7.5	x	x			124
2207	2211.5	4.5	x	x	x	46.5	125
2211.5	2220	8.5	x	x			126
2220	2224.2	4.2	x	x			127
2224.2	2229.7	5.5	x	x			128
2229.7	2236	6.3	x	x			129
2236	2241.3	5.3	x	x			130
2241.3	2244.6	3.3	x	x			131
2244.6	2251	6.4	x	x			132
2251	2257.5	6.5	x	x			133
2257.5	2261.2	3.7	x	x			134
2261.2	2265	3.8	x	x	x	53.5	135
2265	2270	5	x	x			136
2270	2275.5	5.5	x	x			137
2275.5	2280	4.5	x	x			138
2280	2285.5	5.5	x	x			139
2285.5	2290	4.5	x	x			140
2290	2297	7	x	x			141
2297	2300	3	x	x			142
2300	2305	5	x	x			143
2305	2310	5	x	x			144
2310	2312.5	2.5	x	x	x	47.5	145
2312.5	2320	7.5	NO SAMPLE				
2320	2322	2	x	x			146
2322	2325	3	NO SAMPLE				
2325	2330	5	x	x			147
2330	2340	10	x	x			148
2340	2350.5	10.5	x	x			149
2350.5	2360	9.5	x	x			150
2360	2370	10	x	x			151
2370	2380	10	x	x	x	55	152

2380	2390	10	x	x			153	
2390	2400	10	x	x			154	
2400	2407	7	x	x			155	
2407	2410	3	x	x			156	
2410	2415.6	5.6	x	x			157	
2415.6	2420.9	5.3	x	x			158	
2420.9	2423.8	2.9	x	x			159	
2423.8	2427	3.2	x	x			160	
2427	2429.2	2.2	x	x	x	49.2	161	
2429.2	2437.5	8.3	x	x			162	
2437.5	2444	6.5	x	x			163	
2444	2448	4	x	x			164	
2448	2451.7	3.7	x	x			165	
2451.7	2457	5.3	x	x			166	
2457	2462	5	x	x			167	
2462	2469	7	x	x			168	
2469	2473.7	4.7	x	x			169	
2473.7	2479	5.3	x	x	x	49.8	170	
2479	2485.6	6.6	x	x			171	
2485.6	2495.6	10	x	x			172	
2495.6	2505	9.4	x	x			173	
2505	2511.3	6.3	x	x			174	
2511.3	2513.6	2.3	x	x			175	
2513.6	2520	6.4	x	x			176	
2520	2530	10	x	x	x	51	177	
2530	2540	10	x	x			178	
2540	2550	10	x	x			179	
2550	2556	6	x	x			180	
2556	2561.2	5.2	x	x			181	
2561.2	2570	8.8	x	x			182	
2570	2580	10	x	x	x	50	183	
2580	2586.3	6.3	x	x			184	
2586.3	2590	3.7	x	x			185	
2590	2594.7	4.7	x	x			186	
2594.7	2602.1	7.4	x	x			187	
2602.1	2608	5.9	x	x			188	
2608	2615.4	7.4	x	x			189	
2615.4	2621	5.6	x	x			190	
2621	2626.5	5.5	x	x			191	
2626.5	2631.5	5	x	x	x	51.5	192	2631.5B

2631.5	2637.1	5.6	x	x			193	
2637.1	2643.1	6	x	x			194	
2643.1	2647.6	4.5	x	x			195	
2647.6	2653.6	6	x	x			196	
2653.6	2660	6.4	x	x			197	
2660	2670	10	x	x			198	
2670	2680	10	x	x	x	48.5	199	
2680	2690	10	x	x			200	
2690	2700	10	x	x			201	
2700	2710	10	x	x			202	
2710	2720	10	x	x			203	
2720	2730	10	x	x			204	
2730	2733.8	3.8	x	x	x	53.8	205	
2733.8	2734.5	0.7	x	x			206	
2734.5	2740.5	6	x	x			207	
2740.5	2750.5	10	x	x			208	
2750.5	2761	10.5	x	x			209	
2761	2771	10	x	x			210	
2771	2781	10	x	x			211	
2781	2791	10	x	x	x	56.5	212	
2791	2800	9	x	x			213	
2800	2810	10	x	x			214	
2810	2816.5	6.5	x	x			215	
2816.5	2819.5	3	x	x			216	
2819.5	2824.5	5	x	x			217	
2824.5	2830	5.5	x	x			218	
2830	~~2833~~ 2840	3	x	x			~~219~~	
~~2833~~	~~2840~~	~~7~~	x	x			~~220~~	219
2840	2850	10	x	x	x	59	~~221~~	220

BARRINGER LABORATORIES, INC.

RENO, NEVADA, U.S.A., 5301 Longley Lane, Bldg. E, Reno, NV, 89511, TEL: 702-828-1158, FAX: 702-828-1263

BARRINGER LABORATORIOS de MEXICO, S.A.de C.V.
Carretera Panamericana, KM 10445
Durango, Durango, Mexico C.P. 34030
TEL/FAX (52)(18) 12-00-52

BARRINGER LABORATORIES del PERU S.A.
Avenida Domingo Orué 489
Surquillo, Lima 34, Peru
TEL (011-51-1) 222-2801
FAX (011-51-1) 442-7195

BARRINGER de COLOMBIA
Calle 80 Sur N. 47D-65, L-106
Sabaneta, Colombia
TEL (574) 301-0704

BARRINGER LABORATORIOS de MEXICO, S.A. de C.V.
Blvd. García Morales 829-A, Bodega #2
Colonia La Manga
Hermosillo, Sonora, Mexico C.P. 83210
TEL/FAX (011-52-6) 261-0415

BARRINGER LABORATORIES NICARAGUA
COMPLEJO OCAL
Km 7.5 Carretera Norte
Managua, Nicaragua
TEL (011-50-5) 883-0778

McCLELLAND/BARRINGER LABORATORIOS HONDURAS
Kilometro 5,
Boulevard Suyapa
Tegucigalpa, M.D.C., Honduras
TEL (011-50-4) 231-1841

Work Order # _____
Date Received _____
Purchase Order # _____
Project # _____
Date Shipped 9-17-99
Shipped Via _____
# of Cartons _____
# of Samples 44 + 2 Pulps

Geochemical Laboratory Instruction Sheet

Copy of Results:	Results And Invoice To:
Fax to Kurt Allen	Kurt Allen
Rosebud Mining Co. LLC.	Rosebud Mining Co. LLC
Fax # 775 623-6967	P.O. Box 2610
	Winnemucca NV 89446
	AUTHORITY:

No. of Samples	Sample Type	List of Sample Numbers	Elements Requested
44	Core	RS-475-99	Au, Ag - Use Rosebud
		See attachment for sample intervals	Mine development Protocol
			NGC 30 element ICP
			Total Digestion composite as
			shown on attachment
2	Pulps	Standards 2888.4B 2938.0B	Au AAT FA/AA
RS-475-99		RS-475-99	No Ag No ICP
G03-176		MS-3 (RMG1)	
G03-176 2888.4B		2938.0B	

COARSE REJECT (Free storage for 30 days)
- [x] Return/collect after analysis
- [ ] Return/collect after 30 days
- [ ] Discard after 30 days

IF NOT MARKED, REJECT DISCARDED AFTER 30 DAYS

PULP (Free storage for 6 months)
- [x] Return/collect after analysis
- [ ] Return/collect at 6 months
- [ ] Discard at 6 months

IF NOT MARKED, PULP IS DISCARDED AFTER 6 MONTHS

COARSE REJECTS/PULPS WILL BE DISCARDED UNLESS OTHERWISE REQUESTED

Au - GOLD METHOD
- [x] Fire Assay/A.A.
- [ ] Fire Assay/Gravimetric
- [ ] NaCN/A.A.

RESULTS REPORTED IN:
- [ ] ppb
- [ ] PPM
- [x] oz/T
- [ ] grams/T

TRACE ELEMENT METHOD
- [ ] Wet Chem./A.A.
- [ ] Wet Chem./ICP

RESULTS REPORTED IN:
- [ ] ppm
- [ ] Percent %
- [x] oz/T
- [ ] grams/T

ADDITIONAL INSTRUCTIONS:
Rush as per Kurt Allens instructions.

NOV96:PM5:RENO3:GEOCHEM

RS-475-99

Depth From	To	Interval	Au	Ag	ICP	Composite Interval	Sample Number	Pulps
2850	2854	4	x	x			1	
2854	2857.5	3.5	x	x			2	
2857.5	2861.5	4	x	x			3	
2861.5	2863.2	1.7	x	x	x	13.2	4	
2863.2	2866	2.8	x	x			5	
2866	2868.8	2.8	x	x	x	5.6	6	
2868.8	2872	3.2	x	x	x	3.2	7	
2872	2876.5	4.5	x	x			8	
2876.5	2879.5	3	x	x	x	7.5	9	
2879.5	2883.5	4	x	x	x	4	10	
2883.5	2884.7	1.2	x	x			11	
2884.7	2886	1.3	x	x	x	2.5	12	
2886	2888.4	2.4	x	x	x	2.4	13	2888.4B
2888.4	2890.5	2.1	x	x	x	2.1	14	
2890.5	2894.5	4	x	x			15	
2894.5	2899	4.5	x	x	x	8.5	16	
2899	2901	2	x	x			17	
2901	2903.5	2.5	x	x	x	4.5	18	
2903.5	2906.5	3	x	x	x	3	19	
2906.5	2911.5	5	x	x			20	
2911.5	2915	3.5	x	x	x	8.5	21	
2915	2920	5	x	x			22	
2920	2924.5	4.5	x	x			23	
2924.5	2928	3.5	x	x	x	13	24	
2928	2931	3	x	x			25	
2931	2933	2	x	x			26	
2933	2938	5	x	x	x	10	27	2938.0B
2938	2941.5	3.5	x	x			28	
2941.5	2944	2.5	x	x			29	
2944	2948	4	x	x			30	
2948	2951	3	x	x			31	
2951	2955	4	x	x	x	17	32	
2955	2959	4	x	x			33	
2959	2963.5	4.5	x	x	x	8.5	34	
2963.5	2965.5	2	x	x			35	
2965.5	2970.5	5	x	x			36	
2970.5	2975.5	5	x	x			37	
2975.5	2978	2.5	x	x			38	
2978	2981.4	3.4	x	x	x	17.9	39	
2981.4	2982.9	1.5	x	x			40	
2982.9	2987	4.1	x	x			41	
2987	2990.5	3.5	x	x			42	
2990.5	2995.5	5	x	x			43	
2995.5	3000	4.5	x	x	x	18.6	44	

BARRINGER LABORATORIES, INC.

RENO, NEVADA, U.S.A.
5301 Longley Lane, Bldg. E,
Reno, NV, 89511
702-828-1158, FAX 702-828-1263

BARRINGER LABORATORIOS
de MEXICO, S.A.de C.V.
20 De Noviembre #1920-5 Ote.
Durango, Durango, Mexico 34000
TEL (011-52) (18) 17-98-80

BARRINGER LABORATORIOS
de MEXICO, S.A. de C.V.
Blvd. García Morales 829-A, Bodega #2
Colonia La Manga
Hermosillo, Sonora, Mexico C.P. 83210
TEL/FAX (62) 61-04-15

BARRINGER LABORATORIES
del PERU S.A.
Avenida Jose Ramirez Gaston 242
Miraflores, Lima 18, Peru
TEL(01151) (14) 49-17-88

Work Order # _____
Date Received _____
Purchase Order # _____
Project # _____
Date Shipped _____
Shipped Via _____
# of Cartons _____
# of Samples _____

Geochemical Laboratory Instruction Sheet

Copy of Results:	Results And Invoice To:
FAX to KURT ALLEN	KURT ALLEN
# 775-623-6967	ROSEBUD MINING CO.
	P.O. BOX 2610
	WINNEMUCCA, NV 89446
	AUTHORITY:

No. of Samples	Sample Type	List of Sample Numbers	Elements Requested
9	PULP	RS-475-99	Au/Ag METALLIC SCREEN
		2876.5 - 2879.5	ASSAYS USING 150 Mesh SCREEN.
		2879.5 - 2883.5	SCREEN ENTIRE PULP (600g)
		2883.5 - 2884.7	FIRE ASSAY ENTIRE COARSE
		2884.7 - 2886	FRACTION w/ GRAVIMETRIC FINISH.
		2886 - 2888.4	FIRE ASSAY the FINE FRACTION
		2888.4 - 2890.5	USING 1 AT w/ AA finish
		2890.5 - 2894.5	
		2894.5 - 2899	Report all weights & ASSAYS.
		2899 - 2901	

COARSE REJECT (Free storage for 30 days)
- ☐ Return/collect after analysis
- ☐ Return/collect after 30 days
- ☐ Discard after 30 days

IF NOT MARKED, REJECT DISCARDED AFTER 30 DAYS

PULP (Free storage for 6 months)
- ☐ Return/collect after analysis
- ☐ Return/collect at 6 months
- ☐ Discard at 6 months

IF NOT MARKED, PULP IS DISCARDED AFTER 6 MONTHS

COARSE REJECTS/PULPS WILL BE DISCARDED UNLESS OTHERWISE REQUESTED

Au - GOLD METHOD
- ☐ Fire Assay/A.A.
- ☐ Fire Assay/Gravimetric
- ☐ NaCN/A.A.

RESULTS REPORTED IN:
☐ ppb ☐ PPM
☐ oz/T ☐ grams/T

TRACE ELEMENT METHOD
- ☐ Wet Chem./A.A.
- ☐ Wet Chem./ICP

RESULTS REPORTED IN:
☐ ppm ☐ Percent %
☐ oz/T ☐ grams/T

ADDITIONAL INSTRUCTIONS: _____

RS-475-99

Depth From	To	Interval	Au	Ag	ICP	Composite Interval	Sample Number
1600	1603	3	x	x			1
1603	1607	4	x	x			2
1607	1612	5	x	x			3
1612	1616.5	4.5	x	x			4
1616.5	1618.9	2.4	x	x			5
1618.9	1623	4.1	x	x			6
1623	1626.5	3.5	x	x			7
1626.5	1628.8	2.3	x	x			8
1628.8	1631.3	2.5	x	x			9
1631.3	1636	4.7	x	x			10
1636	1639.1	3.1	x	x			11
1639.1	1642	2.9	x	x			12
1642	1646.5	4.5	x	x			13
1646.5	1649.5	3	x	x			14
1649.5	1654	4.5	x	x	x	54	15
1654	1657.8	3.8	x	x			16
1657.8	1662.5	4.7	x	x			17
1662.5	1667.5	5	x	x			18
1667.5	1672.8	5.3	x	x			19
1672.8	1678	5.2	x	x			20
1678	1683.2	5.2	x	x			21
1683.2	1688.5	5.3	x	x			22
1688.5	1692.5	4	x	x			23
1692.5	1697.5	5	x	x			24
1697.5	1703.2	5.7	x	x			25
1703.2	1707.5	4.3	x	x			26
1707.5	1712	4.5	x	x			27
1712	1717	5	x	x	x	63	28
1717	1722	5	x	x			29
1722	1727	5	x	x			30
1727	1733	6	x	x			31
1733	1737	4	x	x			32
1737	1742.5	5.5	x	x			33
1742.5	1747.5	5	x	x			34
1747.5	1749.5	2	x	x			35
1749.5	1753	3.5	x	x			36
1753	1758	5	x	x			37
1758	1763	5	x	x			38
1763	1767.7	4.7	x	x	x	50.7	39

1767.7	1772.7	5	x	x			40	
1772.7	1776.1	3.4	x	x			41	
1776.1	1779	2.9	x	x			42	
1779	1784.5	5.5	x	x			43	
1784.5	1789.5	5	x	x			44	
1789.5	1793	3.5	x	x			45	
1793	1797	4	x	x			46	
1797	1800	3	x	x			47	
1800	1803.1	3.1	x	x			48	
1803.1	1807.9	4.8	x	x	x	40.2	49	1807.9B
1807.9	1813	5.1	x	x			50	
1813	1820	7	x	x			51	
1820	1830	10	x	x			52	
1830	1838.3	8.3	x	x			53	
1838.3	1843.7	5.4	x	x			54	
1843.7	1846.7	3	x	x			55	
1846.7	1851.1	4.4	x	x			56	
1851.1	1856.3	5.2	x	x			57	
1856.3	1860	3.7	x	x	x	52.1	58	
1860	1870	10	x	x			59	
1870	1880	10	x	x			60	
1880	1885.3	5.3	x	x			61	
1885.3	1888	2.7	x	x			62	
1888	1890.5	2.5	x	x			63	
1890.5	1892.4	1.9	x	x			64	
1892.4	1896.5	4.1	x	x	x	36.5	65	
1896.5	1903.5	7	x	x			66	
1903.5	1909	5.5	x	x			67	
1909	1914	5	x	x			68	
1914	1919	5	x	x			69	
1919	1923.4	4.4	x	x			70	
1923.4	1925.1	1.7	x	x	x	28.6	71	
1925.1	1930	4.9	x	x			72	
1930	1934.5	4.5	x	x			73	
1934.5	1939.5	5	x	x			74	
1939.5	1945	5.5	x	x			75	
1945	1955	10	x	x			76	
1955	1960.4	5.4	x	x			77	
1960.4	1963.8	3.4	x	x	x	38.7	78	

1963.8	1967.7	3.9	x	x			79	
1967.7	1972	4.3	x	x			80	
1972	1976.5	4.5	x	x			81	
1976.5	1980	3.5	x	x			82	
1980	1985.3	5.3	x	x	x	21.5	83	
1985.3	1987	1.7	x	x			84	
1987	1991	4	x	x			85	
1991	1994.5	3.5	x	x			86	
1994.5	1997	2.5	x	x			87	
1997	2001	4	x	x			88	
2001	2005	4	x	x			89	
2005	2008	3	x	x			90	
2008	2013	5	x	x	x	27.7	91	
2013	2017	4	x	x			92	
2017	2022	5	x	x			93	
2022	2028	6	x	x			94	
2028	2033	5	x	x			95	
2033	2037.5	4.5	x	x			96	
2037.5	2042	4.5	x	x			97	
2042	2050	8	x	x			98	
2050	2060	10	x	x			99	
2060	2067.4	7.4	x	x	x	54.4	100	2067.4B
2067.4	2070.3	2.9	x	x			101	
2070.3	2075	4.7	x	x			102	
2075	2081	6	x	x			103	
2081	2087.5	6.5	x	x			104	
2087.5	2095	7.5	x	x			105	
2095	2099	4	x	x			106	
2099	2107.5	8.5	x	x			107	
2107.5	2115	7.5	x	x	x	47.6	108	
2115	2124	9	x	x			109	
2124	2129	5	x	x			110	
2129	2134	5	x	x			111	
2134	2140	6	x	x			112	
2140	2150	10	x	x			113	
2150	2156.6	6.6	x	x			114	
2156.6	2160	3.4	x	x			115	
2160	2165	5	x	x		50	116	

2165	2170.5	5.5	x	x			117
2170.5	2175.5	5	x	x			118
2175.5	2180	4.5	x	x			119
2180	2185	5	x	x			120
2185	2190	5	x	x			121
2190	2194.8	4.8	x	x			122
2194.8	2199.5	4.7	x	x			123
2199.5	2207	7.5	x	x			124
2207	2211.5	4.5	x	x	x	46.5	125
2211.5	2220	8.5	x	x			126
2220	2224.2	4.2	x	x			127
2224.2	2229.7	5.5	x	x			128
2229.7	2236	6.3	x	x			129
2236	2241.3	5.3	x	x			130
2241.3	2244.6	3.3	x	x			131
2244.6	2251	6.4	x	x			132
2251	2257.5	6.5	x	x			133
2257.5	2261.2	3.7	x	x			134
2261.2	2265	3.8	x	x	x	53.5	135
2265	2270	5	x	x			136
2270	2275.5	5.5	x	x			137
2275.5	2280	4.5	x	x			138
2280	2285.5	5.5	x	x			139
2285.5	2290	4.5	x	x			140
2290	2297	7	x	x			141
2297	2300	3	x	x			142
2300	2305	5	x	x			143
2305	2310	5	x	x			144
2310	2312.5	2.5	x	x	x	47.5	145
2312.5	2320	7.5	NO SAMPLE				
2320	2322	2	x	x			146
2322	2325	3	NO SAMPLE				
2325	2330	5	x	x			147
2330	2340	10	x	x			148
2340	2350.5	10.5	x	x			149
2350.5	2360	9.5	x	x			150
2360	2370	10	x	x			151
2370	2380	10	x	x	x	55	152

2380	2390	10	x	x			153	
2390	2400	10	x	x			154	
2400	2407	7	x	x			155	
2407	2410	3	x	x			156	
2410	2415.6	5.6	x	x			157	
2415.6	2420.9	5.3	x	x			158	
2420.9	2423.8	2.9	x	x			159	
2423.8	2427	3.2	x	x			160	
2427	2429.2	2.2	x	x	x	49.2	161	
2429.2	2437.5	8.3	x	x			162	
2437.5	2444	6.5	x	x			163	
2444	2448	4	x	x			164	
2448	2451.7	3.7	x	x			165	
2451.7	2457	5.3	x	x			166	
2457	2462	5	x	x			167	
2462	2469	7	x	x			168	
2469	2473.7	4.7	x	x			169	
2473.7	2479	5.3	x	x	x	49.8	170	
2479	2485.6	6.6	x	x			171	
2485.6	2495.6	10	x	x			172	
2495.6	2505	9.4	x	x			173	
2505	2511.3	6.3	x	x			174	
2511.3	2513.6	2.3	x	x			175	
2513.6	2520	6.4	x	x			176	
2520	2530	10	x	x	x	51	177	
2530	2540	10	x	x			178	
2540	2550	10	x	x			179	
2550	2556	6	x	x			180	
2556	2561.2	5.2	x	x			181	
2561.2	2570	8.8	x	x			182	
2570	2580	10	x	x	x	50	183	
2580	2586.3	6.3	x	x			184	
2586.3	2590	3.7	x	x			185	
2590	2594.7	4.7	x	x			186	
2594.7	2602.1	7.4	x	x			187	
2602.1	2608	5.9	x	x			188	
2608	2615.4	7.4	x	x			189	
2615.4	2621	5.6	x	x			190	
2621	2626.5	5.5	x	x			191	
2626.5	2631.5	5	x	x	x	51.5	192	2631.5B

2631.5	2637.1	5.6	x	x			193	
2637.1	2643.1	6	x	x			194	
2643.1	2647.6	4.5	x	x			195	
2647.6	2653.6	6	x	x			196	
2653.6	2660	6.4	x	x			197	
2660	2670	10	x	x			198	
2670	2680	10	x	x	x	48.5	199	
2680	2690	10	x	x			200	
2690	2700	10	x	x			201	
2700	2710	10	x	x			202	
2710	2720	10	x	x			203	
2720	2730	10	x	x			204	
2730	2733.8	3.8	x	x	x	53.8	205	
2733.8	2734.5	0.7	x	x			206	
2734.5	2740.5	6	x	x			207	
2740.5	2750.5	10	x	x			208	
2750.5	2761	10.5	x	x			209	
2761	2771	10	x	x			210	
2771	2781	10	x	x			211	
2781	2791	10	x	x	x	56.5	212	
2791	2800	9	x	x			213	
2800	2810	10	x	x			214	
2810	2816.5	6.5	x	x			215	
2816.5	2819.5	3	x	x			216	
2819.5	2824.5	5	x	x			217	
2824.5	2830	5.5	x	x			218	
2830	2840	10	x	x			219	
2840	2850	10	x	x	x	59	220	
2850	2854	4	x	x			221	
2854	2857.5	3.5	x	x			222	
2857.5	2861.5	4	x	x			223	
2861.5	2863.2	1.7	x	x	x	13.2	224	
2863.2	2866	2.8	x	x			225	
2866	2868.8	2.8	x	x	x	5.6	226	
2868.8	2872	3.2	x	x	x	3.2	227	
2872	2876.5	4.5	x	x			228	
2876.5	2879.5	3	x	x	x	7.5	229	
2879.5	2883.5	4	x	x	x	4	230	
2883.5	2884.7	1.2	x	x			231	
2884.7	2886	1.3	x	x	x	2.5	232	
2886	2888.4	2.4	x	x	x	2.4	233	2888.4B
2888.4	2890.5	2.1	x	x	x	2.1	234	
							235	
2890.5	2894.5	4	x	x			236	

2894.5	2899	4.5	x	x	x	8.5	237	
2899	2901	2	x	x			238	
2901	2903.5	2.5	x	x	x	4.5	239	
2903.5	2906.5	3	x	x	x	3	240	
2906.5	2911.5	5	x	x			241	
2911.5	2915	3.5	x	x	x	8.5	242	
2915	2920	5	x	x			243	
2920	2924.5	4.5	x	x			244	
2924.5	2928	3.5	x	x	x	13	245	
2928	2931	3	x	x			246	
2931	2933	2	x	x			247	
2933	2938	5	x	x	x	10	248	2938.0B
2938	2941.5	3.5	x	x			249	
2941.5	2944	2.5	x	x			250	
2944	2948	4	x	x			251	
2948	2951	3	x	x			252	
2951	2955	4	x	x	x	17	253	
2955	2959	4	x	x			254	
2959	2963.5	4.5	x	x	x	8.5	255	
2963.5	2965.5	2	x	x			256	
2965.5	2970.5	5	x	x			257	
2970.5	2975.5	5	x	x			258	
2975.5	2978	2.5	x	x			259	
2978	2981.4	3.4	x	x	x	17.9	260	
2981.4	2982.9	1.5	x	x			261	
2982.9	2987	4.1	x	x			262	
2987	2990.5	3.5	x	x			263	
2990.5	2995.5	5	x	x			264	
2995.5	3000	4.5	x	x	x	18.6	265	

Kurt

CUSTOMER——: NEWMONT GOLD COMPANY
MINE SITE——: ROSEBUD
HOLE NO.——: RS475
DATE——: 9/13/99

SILVER STATE SURVEYS, INC.

Survey Certified By

RYAN KELLNER

PROJECTED DEPTH-: N/A

MEAS DEPTH (FEET)	TRUE VERTICAL DEPTH (FEET)	TRUE VERTICAL X-SECTION (FEET)	INCL (HORZ) (DEG)	DIRECTION (AZIMUTH)	RECTANGULAR COORDINATES N-S (FEET)	E-W (FEET)	DOGLEG 50FT (DEGREES)	CLOSURE DISTANCE (FEET)	CLOSURE DIR (DEG)	HOLE TEMP (F) (DEG)
0	0.00	0.00	-58.95	148.60	0.00	0.00	0.00	0.00	0.00	107.2
50	43.16	25.25	-60.39	149.28	-21.63	13.03	1.48	25.25	148.93	107.2
100	86.92	49.42	-61.78	149.18	-42.40	25.39	1.40	49.42	149.08	105.5
150	131.12	72.80	-62.45	148.72	-62.43	37.45	0.69	72.80	149.04	105.5
200	175.74	95.36	-63.90	149.49	-81.79	49.04	1.49	95.36	149.05	105.5
250	220.88	116.88	-65.17	149.05	-100.27	60.02	1.28	116.88	149.09	104.6
300	266.45	137.43	-66.23	148.89	-117.90	70.83	0.18	137.43	149.07	103.7
350	312.39	157.18	-67.26	149.45	-134.85	80.75	0.53	157.18	149.09	97.6
370	330.85	164.87	-67.51	149.44	-141.47	84.66	0.18	164.87	149.10	94.9
400	358.64	176.15	-68.29	150.06	-151.22	90.35	0.81	176.15	149.14	93.2
450	405.16	194.50	-68.65	149.48	-167.07	99.58	0.42	194.50	149.20	91.4
480	433.09	205.44	-68.58	148.96	-176.47	105.18	0.34	205.44	149.20	89.7
500	451.77	212.58	-69.60	149.71	-182.61	108.82	0.11	212.58	149.21	87.9
550	498.73	229.76	-70.21	148.26	-197.34	117.87	0.57	229.76	149.19	86.1
600	545.82	246.56	-70.49	146.34	-211.48	126.75	0.35	246.56	149.06	85.3
650	593.00	263.07	-70.87	145.04	-225.15	136.07	0.28	263.07	148.85	83.5
700	640.21	279.48	-70.64	141.99	-238.39	145.87	0.52	279.48	148.54	83.5
750	687.44	295.80	-71.06	143.03	-251.41	155.85	0.27	295.80	148.20	82.6
765	701.62	300.66	-70.87	141.76	-255.28	158.84	0.35	300.66	148.11	82.6
850	782.16	327.74	-71.83	144.75	-277.04	175.11	0.68	327.74	147.70	89.7
900	829.60	343.52	-71.35	146.86	-290.10	183.98	0.31	343.52	147.62	89.7
950	876.99	359.48	-71.42	145.37	-303.35	192.87	0.24	359.48	147.55	89.7
1000	924.40	375.35	-71.56	147.02	-316.54	201.71	0.27	375.35	147.49	89.7

CUSTOMER———: NEWMONT GOLD COMPANY
MINE SITE———: ROSEBUD
HOLE NO.———: RS475
DATE———: 9/13/99

SILVER STATE SURVEYS, INC.

Survey Certified By

RYAN KELLNER

PROJECTED DEPTH—: N/A

MEAS DEPTH (FEET)	TRUE VERTICAL DEPTH (FEET)	TRUE VERTICAL X-SECTION (FEET)	INC. (HORZ) (DEG)	DIRECTION (AZIMUTH)	RECTANGULAR COORDINATES N/S (FEET)	E/W (FEET)	DOGLEG SC/FT (DEGREES)	CLOSURE DISTANCE (FEET)	CLOSURE DIR (DEG)	HOLE TEMP F. (DEG)
1050	971.87	391.05	-71.82	144.89	-329.56	210.50	0.36	391.05	147.43	89.7
1100	1019.29	406.89	-71.24	146.14	-342.62	219.47	0.35	406.89	147.36	89.7
1150	1066.62	423.00	-71.17	146.36	-356.02	228.42	0.05	423.00	147.32	89.7
1200	1113.93	439.19	-71.03	145.19	-369.41	237.53	0.20	439.19	147.26	89.7
1250	1161.18	455.52	-70.82	146.90	-382.98	246.66	0.30	455.52	147.22	89.7
1300	1208.43	471.88	-70.97	145.00	-396.52	255.82	0.32	471.88	147.17	90.5
1350	1255.57	488.51	-70.13	143.74	-410.05	265.52	0.47	488.51	147.08	98.4
1400	1302.58	505.53	-70.01	143.62	-423.78	275.62	0.06	505.53	146.96	98.4
1450	1349.54	522.66	-69.83	142.82	-437.53	285.90	0.16	522.66	146.84	99.3
1500	1396.47	539.86	-69.81	142.33	-451.23	296.38	0.08	539.86	146.70	99.3
1550	1443.42	557.02	-69.96	144.18	-465.01	306.67	0.33	557.02	146.60	100.2
1600	1490.51	573.81	-70.79	145.24	-478.71	316.37	0.45	573.81	146.54	100.2
1650	1537.60	590.61	-69.91	143.41	-492.36	326.18	0.54	590.61	146.48	101.1
1700	1584.60	607.68	-70.13	145.71	-506.28	336.09	0.41	607.68	146.42	102.0
1750	1631.59	624.75	-69.93	144.38	-520.27	345.87	0.25	624.75	146.38	102.8
1800	1678.55	641.90	-69.92	144.48	-534.23	355.85	0.02	641.90	146.33	103.7
1850	1725.45	659.23	-69.51	144.98	-548.38	365.86	0.22	659.23	146.29	103.7
1900	1772.29	676.71	-69.53	145.04	-562.71	375.89	0.01	676.71	146.26	104.6
1950	1819.17	694.10	-69.76	144.86	-576.95	385.88	0.12	694.10	146.22	106.4
2000	1866.10	711.35	-69.88	145.24	-591.09	395.76	0.09	711.35	146.20	107.2
2050	1913.15	728.26	-70.56	145.12	-604.98	405.42	0.34	728.26	146.17	108.1
2100	1960.40	744.61	-71.26	145.05	-618.38	414.78	0.36	744.61	146.15	109.9
2150	2007.97	760.00	-72.83	148.44	-631.25	423.24	0.94	760.00	146.16	109.9

CUSTOMER———: NEWMONT GOLD COMPANY
MINE SITE———: ROSEBUD
HOLE NO.———: RS475
DATE———: 9/13/99

SILVER STATE SURVEYS, INC.

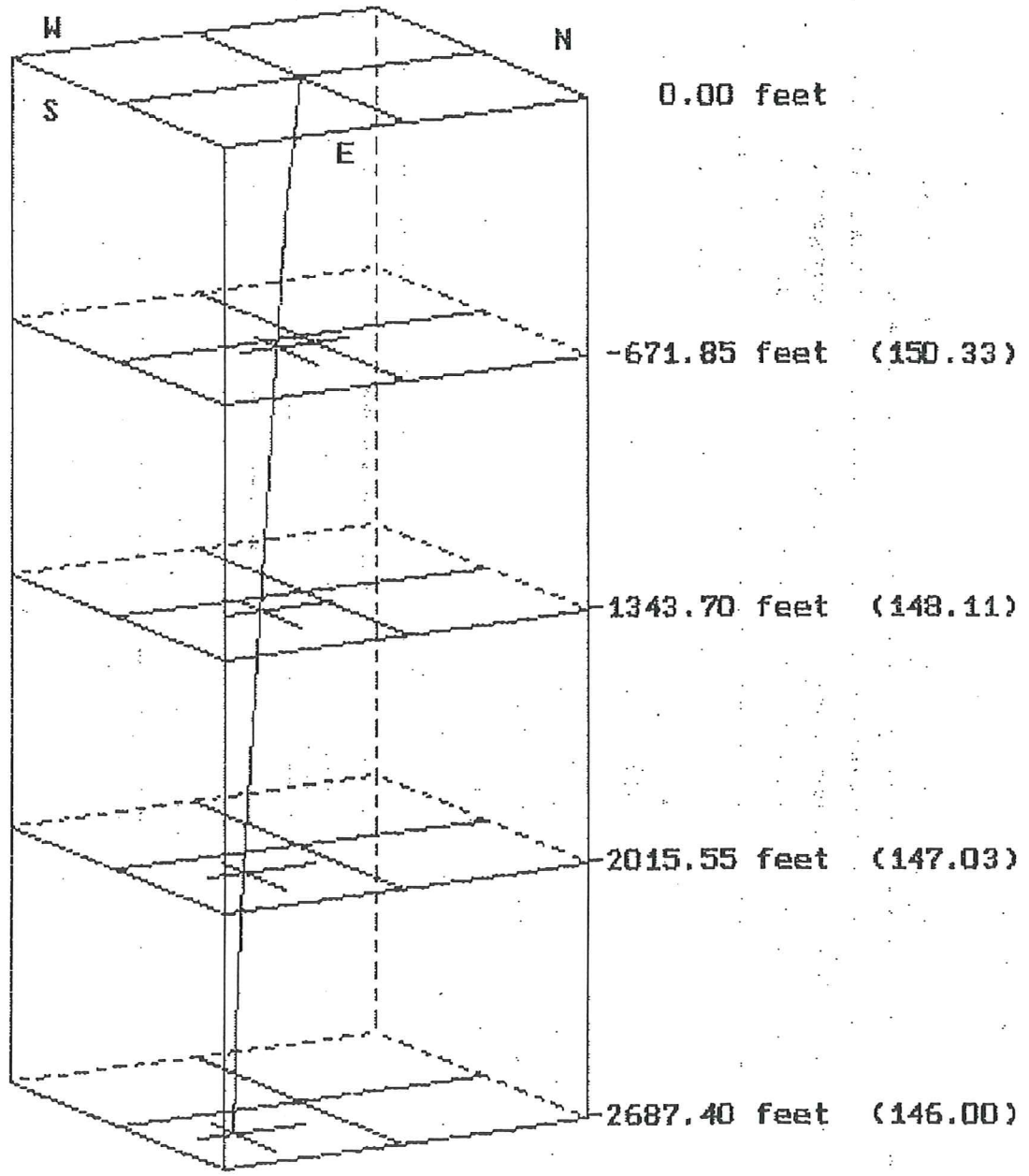
Survey Certified By

RYAN KELLNER

PROJECTED DEPTH-: N/A

MEAS DEPTH (FEET)	TRUE VERTICAL DEPTH (FEET)	TRUE VERTICAL X-SECTION (FEET)	N/S (HORZ) (DEG)	DIRECTION (AZIMUTH)	RECTANGULAR COORDINATES N+S (FEET)	E+W (FEET)	DOGLEG (DEG/FT) (DEGREES)	CLOSURE DISTANCE (FEET)	CLOSURE DIR (DEG)	HOLE TEMP (F) (DEG)
2200	2055.77	774.64	-73.08	149.60	-643.81	430.78	0.21	774.64	146.21	111.6
2250	2103.69	788.89	-73.75	148.44	-656.05	438.13	0.37	788.89	146.26	112.5
2300	2151.74	802.72	-74.11	148.24	-667.83	445.39	0.18	802.72	146.30	112.5
2350	2199.88	816.23	-74.53	147.49	-679.27	452.58	0.23	816.23	146.33	113.4
2400	2248.18	829.14	-75.54	144.29	-689.96	459.61	0.65	829.14	146.32	114.3
2450	2296.71	841.18	-76.56	142.37	-699.63	467.00	0.56	841.18	146.28	115.1
2500	2345.38	852.58	-76.92	138.35	-708.47	474.31	0.50	852.58	146.20	116.0
2550	2394.03	863.99	-76.39	136.58	-716.97	482.11	0.33	863.99	146.08	116.9
2600	2442.69	875.27	-77.10	135.16	-725.20	490.09	0.39	875.27	145.95	117.8
2650	2491.49	886.01	-77.66	135.33	-732.96	497.78	0.28	886.01	145.82	118.7
2700	2540.35	896.40	-77.84	133.08	-740.35	505.39	0.26	896.40	145.68	120.4
2750	2589.26	906.51	-78.22	132.38	-747.39	513.00	0.20	906.51	145.53	121.3
2800	2638.23	916.38	-78.46	133.66	-754.29	520.39	0.16	916.38	145.40	122.2
2850	2687.30	925.86	-79.38	138.28	-761.18	527.08	0.64	925.86	145.30	122.2

3D PROJECTION



Survey File: RS475B
Customer: NEWMONT
Date: 9-30-99
Time: 11:17:28

HORIZONTAL PROJECTION

Survey File: RS475B

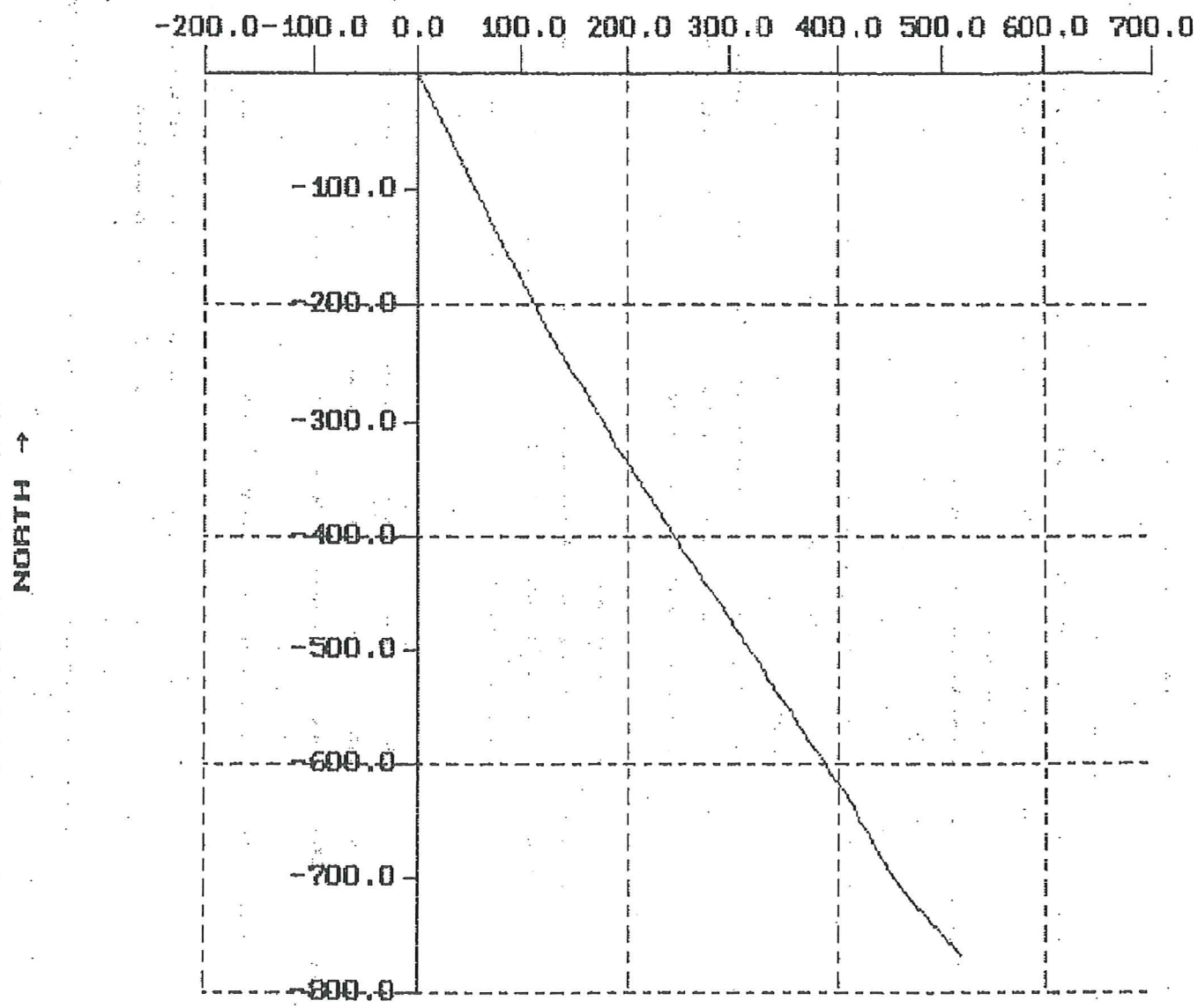
Customer: NEWMONT

Starting from 0.0 E/W 0.0 N/S

Bottom closure direction: 146.0

Time: 11:17:28

Date: 9-30-99



E/W Data Max: 517.0

E/W Data Min: 0.0

(scale in feet)

N/S Data Max: 0.0

N/S Data Min: -766.6

VERTICAL PROJECTION

Survey File: RS475B

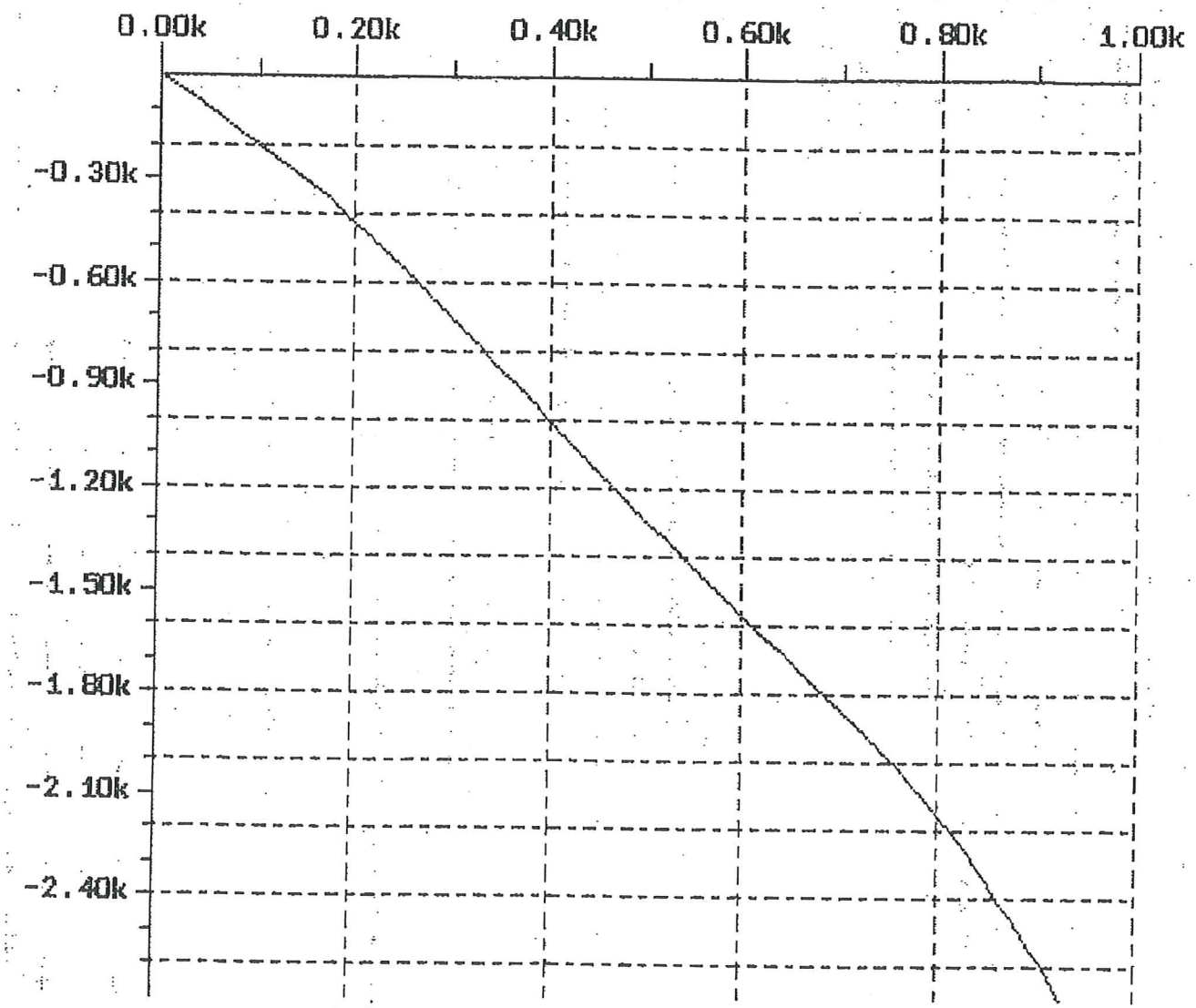
Customer: NEWMONT

Section direction: 146.0

Starting from 0.0 E/W 0.0 N/S

Time: 11:17:28

Date: 9-30-99



Horiz Data Max: 924.7

Horiz Data Min: 0.0

(scale in feet)

Vert Data Max: 0.0

Vert Data Min: -2687.4

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-D475-99 DATE: 9-29-99 LOGGED BY: D.G. Macherrow PAGE 1 OF 16

DRILL RUN FROM	DRILL RUN TO	SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH DOWNHOLE DEPTH	ROCK STRENGTH POINT LOAD INDEX (psi)	FRACTURE DATA FRACTURE DENSITY /FT.	FRACTURE DATA AVG. ANGLE TO C.A.	FRACTURE DATA ROUGHNESS	FRACTURE DATA INFILL	DENSITY DATA DOWNHOLE DEPTH	DENSITY DATA SAMPLE WEIGHT (g)	DENSITY DATA DISPLACEMENT (cc)	DENSITY DATA DENSITY (g/cc)
1600	1600.5	0	100	0										
1600.5	1607	54	100	15										
1607	1616.5	74	100	42										
1616.5	1626.5	78	81	51										
1626.5	1636	85	118	34										
1636	1646.5	100	100	92										
1646.5	1657	100	102	80										
1657	1667.5	98	100	69										
1667.5	1678	100	100	85										
1678	1688.5	100	100	90										
1688.5	1697.5	100	95	82										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 9-30-99 LOGGED BY: D.G. MacKerrow PAGE 2 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
1697.5	1707.5	55	100	52										
1707.5	1716.5	69	100	41										
1716.5	1727	100	100	90										
1727	1737	98	100	94										
1737	1747.5	76	100	57										
1747.5	1758	100	102	93										
1758	1768.5	100	100	95										
1768.5	1779	85	100	75										
1779	1789.5	92	100	57										
1789.5	1793	94	100	77										
1793	1800	46	100	5										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-1-99 LOGGED BY: D.G. Muckerrow PAGE 3 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
1800	1810	100	100	65										
1810	1813	100	93	80										
1813	1820	100	113	90										
1820	1830	100	99	91										
1830	1840	100	89	62										
1840	1850	95	106	89										
1850	1860	100	104	99										
1860	1870	100	100	96										
1870	1880	82	100	60										
1880	1890.5	100	96	48										
1890.5	1896.5	47	100	28										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-1-99 LOGGED BY: D.G. Muckerrow PAGE 4 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
1896.5	1903.5	37	100	20										
1903.5	1914	95	100	71										
1914	1924	99	105	74										
1924	1934.5	69	96	48										
1934.5	1945	89	93	68										
1945	1955.5	100	100	94										
1955.5	1966	98	100	92										
1966	1976.5	100	94	84										
1976.5	1987	100	95	61										
1987	1994.5	0	66	0										
1994.5	1997	84	124	84										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-2-99 LOGGED BY: D.G. MacKerrow PAGE 5 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY /FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
1997	2005	100	95	52										
2005	2011	72	93	0										
2011	2017	78	100	6										
2017	2022	60	100	40										
2022	2028	42	100	18										
2028	2033	94	100	38										
2033	2037.5	96	100	13										
2037.5	2042	22	100	11										
2042	2050	91	100	52										
2050	2060	81	100	30										
2060	2066	100	93	55										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-47S-99 DATE: 10-3-99 LOGGED BY: D.G. Mackerron PAGE 6 OF 16

DRILL RUN FROM	DRILL RUN TO	SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH DOWNHOLE DEPTH	ROCK STRENGTH POINT LOAD INDEX (psi)	FRACTURE DATA FRACTURE DENSITY /FT.	FRACTURE DATA AVG. ANGLE TO C.A.	FRACTURE DATA ROUGHNESS	FRACTURE DATA INFILL	DENSITY DATA DOWNHOLE DEPTH	DENSITY DATA SAMPLE WEIGHT (g)	DENSITY DATA DISPLACEMENT (cc)	DENSITY DATA DENSITY (g/cc)
2066	2075	100	94	43										
2075	2081	100	108	27										
2081	2087.5	100	104	28										
2087.5	2094	83	101	11										
2094	2099	16	100	0										
2099	2107.5	65	100	16										
2107.5	2115	100	97	7										
2115	2124	78	92	12										
2124	2126	35	135	0										
2126	2129	20	100	0										
2129	2134	62	100	8										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-3-99 LOGGED BY: D. G. MacKerrow PAGE 7 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY /FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2134	2140	27	100	0										
2140	2145.5	78	100	0										
2145.5	2150	51	100	8										
2150	2160	73	100	19										
2160	2163.5	83	114	11										
2163.5	2170.5	100	97	33										
2170.5	2175.5	98	100	0										
2175.5	2180	100	100	22										
2180	2182	0	100	0										
2182	2188.5	72	100	25										
2188.5	2193.5	46	94	16										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-3-99 LOGGED BY: D.G. Macherrow PAGE 8 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY /FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2193.5	2199.5	58	100	18										
2199.5	2200	6	120	0										
2200	2207	100	98	17										
2207	2211.5	128	140	75										
2211.5	2220	100	82	12										
2220	2230.5	100	96	28										
2230.5	2240.5	98	101	12										
2240.5	2249.5	63	100	12										
2249.5	2257.5	26	100	6										
2257.5	2265	69	103	0										
2265	2275.5	77	100	6										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-4-99 LOGGED BY: D.G. MacKerrow PAGE 9 OF 16

DRILL RUN		SOLID CORE	TOTAL CORE	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO	RECOVERY (%)	RECOVERY (%)		DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2275.5	2283	29	100	0										
2283	2285.5	0	100	0										
2285.5	2292	17	100	0										
2292	2295	50	100	0										
2295	2300	24	108	0										
2300	2305	0	100	0										
2312.5	2320	0	Core loss 0	0										
2320	2320.5	0	100	0										
2320.5	2322	40	53	0										
2322	2325	0	Core loss 0	0										
2325	2326	0	120	0										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-4-99 LOGGED BY: D.G. MacHerrow. PAGE 10 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2326	2330	50	107	12										
2330	2340	100	50	72										
2340	2350.5	98	97	69										
2350.5	2360	100	100	40										
2360	2370	100	101	14										
2370	2380	73	100	18										
2380	2390	100	102	47										
2390	2400	100	103	70										
2400	2410	87	100	55										
2410	2420	84	100	29										
2420	2427	78	98	27										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-11-99 LOGGED BY: D.G. Mackerrow PAGE 11 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2427	2437.5	100	100	52										
2437.5	2448	91	100	28										
2448	2458.5	100	98	47										
2458.5	2469	97	98	26										
2469	2479	96	103	69										
2479	2489.5	100	100	68										
2489.5	2500	90	100	24										
2500	2510	100	102	23										
2510	2520	71	98	36										
2520	2530	87	100	42										
2530	2540	100	103	88										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-11-99 LOGGED BY: D.G. Mackerrow PAGE 12 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY (FT.)	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2540	2550	100	102	48										
2550	2560	87	100	60										
2560	2570	95	100	55										
2570	2580	100	100	65										
2580	2590	34	100	0										
2590	2600.5	88	100	56										
2600.5	2611	76	100	16										
2611	2621	95	102	62										
2621	2631.5	80	98	18										
2631.5	2641.5	62	100	0										
2641.5	2650	32	100	8										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-13-99 LOGGED BY: D.G. Mackerrow PAGE 12 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY/FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2650	2660	74	100	15										
2660	2670	94	100	22										
2670	2680	98	100	74										
2680	2690	100	102	84										
2690	2700	100	100	31										
2700	2710	100	102	63										
2710	2719	100	102	68										
2719	2729.5	85	100	28										
2729.5	2740	100	102	68										
2740	2750.5	100	102	74										
2750.5	2761	100	102	48										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 10-13-99 LOGGED BY: D.C. MacHerrow PAGE 13 OF 16

DRILL RUN FROM	DRILL RUN TO	SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH DOWNHOLE DEPTH	ROCK STRENGTH POINT LOAD INDEX (psi)	FRACTURE DATA FRACTURE DENSITY /FT.	FRACTURE DATA AVG. ANGLE TO C.A.	FRACTURE DATA ROUGHNESS	FRACTURE DATA INFILL	DENSITY DATA DOWNHOLE DEPTH	DENSITY DATA SAMPLE WEIGHT (g)	DENSITY DATA DISPLACEMENT (cc)	DENSITY DATA DENSITY (g/cc)
2761	2771.5	96	98	51										
2771.5	2781.5	72	101	35										
2781.5	2792	90	98	53										
2792	2800	100	102	40										
2800	2810	91	103	58										
2810	2819.5	67	103	10										
2819.5	2830	71	102	52										
2830	2840	50	98	23										
2840	2850	74	102	33										
		Continued on Page 14												

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-475-99 DATE: 9-15-99 LOGGED BY: D.G. MacGregor PAGE 14 OF 16

DRILL RUN FROM	DRILL RUN TO	SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH DOWNHOLE DEPTH	ROCK STRENGTH POINT LOAD INDEX (psi)	FRACTURE DATA FRACTURE DENSITY/FT.	FRACTURE DATA AVG. ANGLE TO C.A.	FRACTURE DATA ROUGHNESS	FRACTURE DATA INFILL	DENSITY DATA DOWNHOLE DEPTH	DENSITY DATA SAMPLE WEIGHT (g)	DENSITY DATA DISPLACEMENT (cc)	DENSITY DATA DENSITY (g/cc)
2850	2857.5	73	100	24										
2857.5	2866	100	100	36										
2866	2876.5	100	100	38										
2876.5	2886	100	109	51										
2886	2887.5	100	86	40										
2887.5	2888	100	100	100										
2888	2892.5	71	100	22										
2892.5	2899.5	40	107	8										
2899.5	2901	0	106	0										
2901	2906.5	0	109	0										
2906.5	2911.5	100	100	56										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-D475-99 DATE: 9-15-99 LOGGED BY: D.G. Macherrow PAGE 15 OF 16

DRILL RUN FROM	DRILL RUN TO	SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH DOWNHOLE DEPTH	ROCK STRENGTH POINT LOAD INDEX (psi)	FRACTURE DATA FRACTURE DENSITY /FT.	FRACTURE DATA AVG. ANGLE TO C.A.	FRACTURE DATA ROUGHNESS	FRACTURE DATA INFILL	DENSITY DATA DOWNHOLE DEPTH	DENSITY DATA SAMPLE WEIGHT (g)	DENSITY DATA DISPLACEMENT (cc)	DENSITY DATA DENSITY (g/cc)
2911.5	2915	100	94	57										
2915	2920	48	100	14										
2920	2924.5	71	104	44										
2924.5	2930	36	100	22										
2930	2933	0	100	0										
2933	2938	0	88	0										
2938	2940.5	0	100	0										
2940.5	2944	77	100	0										
2944	2948	52	100	20										
2948	2955	71	97	11										
2955	2959	0	100	0										

HECLA MINING COMPANY – ROSEBUD PROJECT
GEOTECHNICAL DRILL LOG

HOLE # RS-D475-99 DATE: 9-15-99 LOGGED BY: D.G. MacKenzie. PAGE 16 OF 16

DRILL RUN		SOLID CORE RECOVERY (%)	TOTAL CORE RECOVERY (%)	RQD	ROCK STRENGTH		FRACTURE DATA				DENSITY DATA			
FROM	TO				DOWNHOLE DEPTH	POINT LOAD INDEX (psi)	FRACTURE DENSITY /FT.	AVG. ANGLE TO C.A.	ROUGHNESS	INFILL	DOWNHOLE DEPTH	SAMPLE WEIGHT (g)	DISPLACEMENT (cc)	DENSITY (g/cc)
2959	2960.5	60	100	0										
2960.5	2965.5	46	110	0										
2965.5	2970.5	99	94	36										
2970.5	2978	73	100	0										
2978	2982.5	73	96	33										
2982.5	2990.5	100	100	29										
2990.5	3000	100	100	17										

2720
RS-475-99 BOX 129
DEPTH 2719.5-2728.5

RS-475-99
BOX 128
DEPTH
2711_0-2719_5

RS-475-99
BOX 130
DEPTH
2728.5-2737.0

RS-475-99
BOX 131
DEPTH
2737_0-2746_0

RS-475-99
BOX 132
DEPTH
2746_0-2755_0

RS-475-99
BOX 133
DEPTH
2755_0-2764_0

RS-D365-99
BOX 17
DEPTH
145 - 154_1

RS-D365-99
BOX 18
DEPTH
154_1- 162
155
157
160-1

RS-D365-99
BOX 19
DEPTH
162- 171.6
162

RS-D365-99
BOX 20
DEPTH
171_6- 179_4

RS-D365-99
BOX21
DEPTH
179.4- 189

RS-D365-99
BOX22
DEPTH
189 - 198.4

RS-D365-99
BOX 23
DEPTH
198.4-207

RS-D365-99
BOX 24
DEPTH
207-216

RS-D365-99
BOX 25
DEPTH
216-223_1

RS-D365-99
BOX 26
DEPTH
223_1-232_5

RS-D365-99
BOX 33
DEPTH
304_5-314

RS-D365-99
BOX 32
DEPTH
295.5-304.5
302
5/5

RS-D365-99
BOX 31
DEPTH
286_5-295_5

RS-D365-99
BOX 30
DEPTH
277-286.5

RS-D365-99
BOX29
DEPTH
268-277

RS-D365-99
BOX28
DEPTH
259.5-268

RS-D365-99
BOX29B
DEPTH
259.5-268

RS-D365-99
BOX28B
DEPTH
241_5-250_8

FRENCH