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FLOWERY PROJECT, STOREY COUNTY, NEVADA

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FLOWERY PROJECT, STOREY COUNTY, NEVADA

Introduction

The Flowery Project is located about 20 miles southeast of Reno, Nevada near Virginia City, Storey County, Nevada (Figure 1). The property lies in Sections 23 and 24, T17N, R21E, about three miles east of the world famous Comstock Lode which produced over 192 million ounces of silver and eight million ounces of gold. The Flowery district and Comstock Lode share more than a common geographic setting. Both districts have similar host rocks, similar epizonal plutons that lie in the footwall of the mineralization, similar alteration and veining, and a similar style and trend of mineralization.

District scale mapping (1:10,000) of the Flowery area began in 1979. Detailed mapping (1:1000) and sampling of the exposed mineralization was conducted in 1980. Reverse circulation drilling was conducted in 1980 and 1981.

Land Status

Property acquisition was initiated in 1979. Anaconda has staked 93 unpatented lode claims and fractions. Anaconda also controls 31 unpatented claims by lease from the Flowery Gold Mines Co. and 14 unpatented and six patented claims and millsites from D. L. Davis Assoc. The Green Mt. and After Thought lode claims are controlled via individual lease agreements. Property negotiations for four additional claims, the Josephine (Haphazard Fraction), Potomac, Mammoth and Kimbark, located in the North Bonanza area, are currently underway. Details of the agreements, current negotiations and pertinent claim maps are available through the Anaconda Minerals Co. Land Department.

LOCATION MAP FOR FLOWERY PROJECT

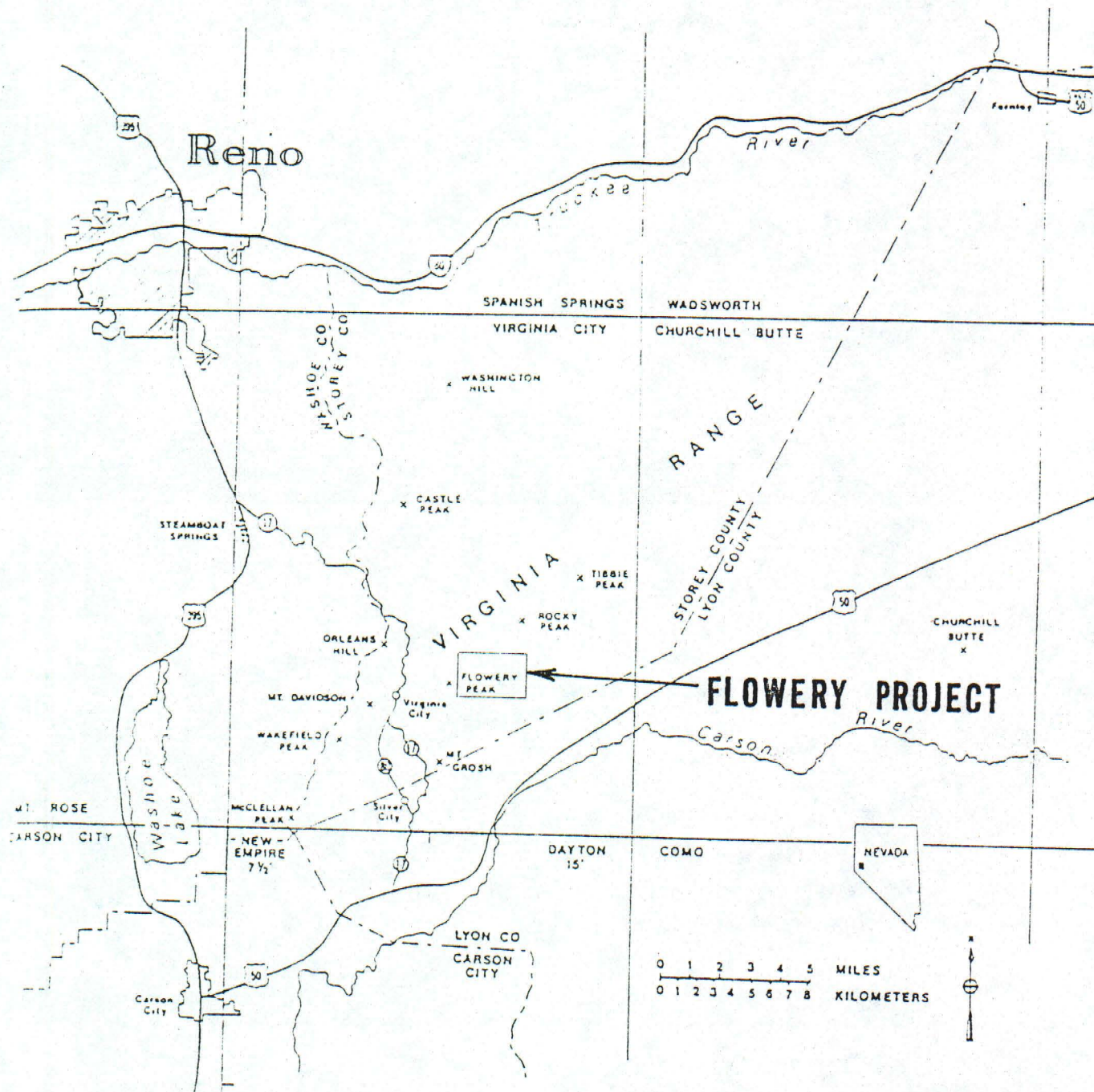


Figure 1

Environmental and Political Considerations

No major environmental problems are presently foreseen in the Flowery district. The Flowery district is visually isolated from the nearby towns of Virginia City and Dayton. Disturbance in the area from previous mining activities is such that present exploration programs do not have a significant impact. High water flows, commonly greater than 90 gallons per minute, have been intercepted in most holes penetrating the water table.

Anaconda has completed a program to eliminate hazards that are the result of previous mining excavations in the Flowery district.

The Flowery district lies adjacent to, but just outside, the boundary of the Comstock National Landmark District (federal) which includes most of the Virginia City area. The Nevada State Comstock Historic District (state) does, however, include all of the land presently controlled by Anaconda. The main focus of the Nevada Commission that administers the State Historic District seems to be the preservation of man-made structures of historic interest. With the possible exception of the hoist foundation near the Lady Bryan shaft there are no foreseeable problem areas within the Flowery district. An archeological survey was conducted at the property in 1980. No archeological sites were recognized. Aside from appropriate permits and notifications, restrictions were not imposed by federal, state, or county authorities.

Flowery Mining History

The original Lady Bryan claim was located in 1860. Three years later a shaft was sunk to about 600 feet and drifts were excavated on the 280, 340, and 400 levels. It is unclear from old reports exactly where this shaft is located. It may correspond to the west shaft on the United Mining Co. composite underground map. Work on the claim was stopped in 1866 when further attempts to develop a commercial reserve failed. In 1874 the Lady Bryan Company began sinking a three compartment shaft to 600 feet. Drifts to the north and south were driven on 250, 380, 500, and 600 levels. Crosscuts and drifts were driven from the old shaft on the 80 and 170

level. The drift on the 170 level connected with the new shaft. Ore was intersected on the 250 and 380 drifts (north and south) and on the extended 80 and 170 levels. The shaft cut the hanging wall of the Flowery lode at the 400 foot level.

Production reported in the district from 1868 to 1876 includes 3425 tons with a gross value of \$64,507 or \$18.33/ton. From 1877 to 1880 the shaft was extended to the 750 level and an incline to a depth of 900 feet was driven. Drilling below the shaft bottom produced no indication of ore-grade material and operations were suspended in 1881. Total production from the Lady Bryan shaft (may include some Pet ore) from 1862 to 1882 was 6275 tons with a gross value of \$91,538.00. Various owners worked on the surface of the claim intermittently through the 1880's. Production reached only about 1372 tons in 1884 with values averaging about \$16/ton.

Stopes within the Pet silver mine, worked in the 1870's, were developed to the surface. No specific reference in historical compilations is made of the Pet Mine although mention of the "old shaft" and the 80 and 170 levels refer in part to workings within the Pet area. Open stopes were filled with rock debris sometime in the 1960's.

In 1918, Tom and William Berry, panning in the ravine near the Pet Mine, located a gold source in silicified rock on the hill on the north side of the gulch. After excavation of a 60 foot shaft and a 300 foot tunnel was completed, the Comstock Merger Company, working under a lease, developed a 100 foot wide zone of gold bearing quartz stockwork having a N50E strike and a 70° dip SE. Although local grades and tonnages were intriguing, the entire width was uneconomic. The surface outcrops in the area carried only trace amounts of gold to a depth of about 30 feet.

In 1924, the Berry brothers offered a partnership in the property to Roy Hardy and Alex Wise in exchange for financial backing for a 100 ton mill. Selective mining within shrinkage stopes provided a relatively quick pay back for construction costs. In an effort to mine the lower grade parts of the zone, thereby extending the life of the reserve, a glory hole system of mining was developed. Stripping of 30 feet of overburden required an ore to waste ratio of 3 to 1. A total of 300,000 tons were

milled with a gross value of about \$1,000,000 at \$20.67 oz gold. The Berry open pit in 1928 was 225 feet long, 140 feet wide and 100 feet deep. A tunnel driven beneath the pit for drawing ore from the stopes intersected a possible bottom to ore indicating that the mineralized zone was only about 150 feet thick in this area. Drift assays taken later averaged only 0.02 oz/ton Au and 0.06 oz/ton Ag, but these were taken in an apparent hanging wall zone(?) of the andesite porphyry where quartz stockwork had developed.

At about the same time a 200 foot vertical shaft (Flowery shaft) was sunk near the old Pet Mine to explore the deep extension of the Pet stopes on the 100 and 200 foot levels. Drift assays indicate values that range from \$70 to \$45.50 for five foot sample widths with gold at \$35 per ounce. It is recognized that these values probably represent Ag:Au ratios of about 10-20:1. Samples taken by D. C. Gilbert in 1936 from the 100 foot level averaged 0.13 oz/ton Au and 1.73 oz/ton Ag with a range from trace to 0.63 oz/ton Au and 0.2 to 4.0 oz/ton Ag. Sometime between 1924 and 1929 Mr. Wise acquired the ground (called the Lady Bryan) across the gully from the Berry Pit operation. A drift beneath the ground intersected 100 feet of mill grade material and suggested that a similar glory hole-stope method of mining might be possible. It was expected that the Lady Bryan glory hole would produce as much ore as the Berry Pit. Production records for the Flowery Mine Co. from 1924 to 1929 indicate that more than 250,000 tons of ore were processed with a gross yield of about \$945,000. Year by year grades from 1924 to 1929, in a 1975 report to Norwich Resources, Ltd., from a consultant geologist in Vancouver, B.C. indicate that gold production averaged about 0.22 oz/ton and Ag about 0.10 oz/ton.

In the late 1920's Hardy sold out to Wise and in the market crash of 1929 the entire operation was closed down and the mill was sold to the Dayton Consolidated Mining Co. Mr. Hardy acquired the property again sometime in the 1930's. United Mines Co. (D. L. Davis Assoc.) subsequently obtained the bulk of the district and in 1975, Colt Resources, Ltd. and Norwich Resources, Ltd. in a joint partnership, optioned the Flowery District. They conducted an 81 hole percussion drilling program in the Lady Bryan-Berry area. The holes were drilled to an average depth of 50 feet. Reported results around the Lady Bryan glory hole ranged from

0 to 0.268 oz/ton Au and from 0 to 6.40 oz/ton Ag. Arithmetic averages of 57 sampling intervals (10 foot widths) were 0.0629 oz/ton Au and 0.312 oz/ton Ag. Two holes drilled side by side at the mouth of the Berry pit averaged 0.385 oz/ton Au (20 ft.) and 0.304 oz/ton Au (30 feet).

A sampling and drilling program was conducted at Flowery in 1977 by Deterra Mines Corporation. Short (20-48 feet deep) drill holes and extensive trench, outcrop and dump sampling were undertaken. One drill hole in the Pet Mine area produced two 12 foot intervals that ran 1.74 oz/ton Au and 52.9 oz/ton Ag and 1.50 oz/ton Au and 58.7 oz/ton Ag respectively. All other drill data in the same area ran about 0.02 to 0.06 oz/ton Au. Sampling data in the Lady Bryan-Pet areas indicates values of about 0.04 to 0.06 oz/ton Au and 0.10 to over 2 oz/ton Ag. One significant set of surface samples from a zone about 400 feet northwest of the Lady Bryan glory hole averaged 0.04 oz/ton Au and about 3.0 oz/ton Ag.

Anaconda obtained an option on part of the Flowery district from United Mines Co. and staked additional claims in the fall of 1979. Regional mapping, detailed mapping of alteration and mineralization, channel rock chip sampling, soil geochemical surveys and additional land acquisition were subsequently conducted. Reverse circulation drill programs based on these results were undertaken in 1980 and 1981.

Geologic Setting

The oldest rocks in the Flowery/Comstock region are Mesozoic sediments of probable Triassic age. These rocks were intruded by later Mesozoic (Jurassic) granitic plutons. During the Miocene the area was overlain by Hartford Hill and related ash flow tuffs. In later Tertiary time the Virginia City area was an andesitic to rhyodacitic volcanic center which produced the Alta and Kate Peak formations. The Old Gregory, Chlorophagus, and Desert Peak formations, which are intermediate in age between the Alta and Kate Peak formations and have an aggregate thickness of 7200 feet, are not known to be present in the Comstock Lode-Flowery area. Most of the precious metal mineralization occurs along post-Hartford Hill age normal faults in the Alta Formation. The following discussion is a description of

Alta and Kate Peak units that have been mapped in the Flowery district (Plate I).

Volcanic Stratigraphy

The two named formations exposed in the Flowery district are the Alta and Kate Peak formations. These units are poorly defined, and only imprecisely mapped, in the Comstock region. The formational nomenclature used in this report may be later found to be at odds with the terms "Alta" and "Kate Peak" as used elsewhere, but they are useful terms as an aid to the discussion of the geology of the Flowery district. The older unit, the Alta Formation, has been dated at 15.4 m.y. This K/Ar date is from a flow about 200 feet above the supposed base of the formation, but the relationship of this dated unit from the Virginia City area to the presumed Alta rocks of the Flowery district is not known. Flow units in the Kate Peak Formation have been dated at 12.4 and 12.8 m.y.

The lowest bedded unit of the Alta Formation in the Flowery district is an andesite breccia. The breccia is poorly exposed in small outcrops near the mouth of North Bonanza Creek and above its junction with Six Mile Canyon. Fragments of very fine grained andesitic rock with few (3-10%) plagioclase phenocrysts characterize this unit. The fragments are typically in contact with one another, and generally range from 1 to 5 cm in maximum dimension. Bedding is not commonly apparent, but locally exposures of distinct sedimentary bedding have been observed. The andesite breccia is probably a volcanoclastic rock of sedimentary origin. The base of the unit is not exposed, but the unit is probably over 100 meters thick. It is also possible that the andesite breccia should be viewed as a local unit within the volcanoclastic member of the Alta Formation.

Overlying the andesite breccia is the thick volcanoclastic member of the Alta Formation. Good exposures of the unit are found in North Bonanza Canyon upstream from the mine workings, and in the low hills on the south side of Six Mile Canyon downstream from the road to the North Bonanza area. The unit is massively bedded and is typically composed of poorly sorted coarse sand sized clasts of feldspar and lithic detritus of andesitic

composition. The matrix is clay rich, in part due to propylitic alteration, and it is commonly megascopically difficult to discern grain/matrix boundaries. Larger clasts of andesite rock fragments are common in some beds, and relatively uncommon plutonic clasts, up to one meter or more in maximum diameter, are locally present. Cross bedding, graded beds, lenses of fine sandstone and siltstone, and rare plant fragments clearly demonstrate the sedimentary character of this volcanoclastic unit. Locally andesitic flows are present but probably make up less than 20 percent of the unit. Textures in many massive outcrops have been sufficiently altered so that it is difficult to conclusively demonstrate either a volcanic or sedimentary origin for some of the rocks. The volcanoclastic member of the Alta is the thickest member mapped in the Flowery district. Intrusive dikes may dilate the section but it probably exceeds 900 meters in thickness.

Locally present at the top of the volcanoclastic member is an andesite flow. The flow is most common in the western part of the Flowery district and is referred to as "F-1." The andesite contains abundant phenocrysts in a fine grained matrix. Pyroxene is more abundant than hornblende. The groundmass to phenocryst ratio is about 1:1. It is estimated that the unit is up to about 150 meters thick.

Overlying the previously described units of the Alta is a package of rocks referred to in the Flowery District as the "Kate/Alta transition." These units appear to be conformable with the underlying Alta and are unconformably overlain by the rocks defined as Kate Peak Formation. The transitional package rocks appear to be more dacitic in composition, and thus are more similar to Kate Peak than Alta lithologies. The transitional package is best exposed on the slopes above Six Mile Canyon, southwest of the Pet-Lady Bryan area.

The basal unit of the Kate/Alta transition is a dacite flow with euhedral to subhedral, 2-3 mm plagioclase phenocrysts. The white phenocrysts typically appear as prominent grains in a fine grained, dark gray groundmass. The groundmass to phenocryst ratio is about 6:1. Rare quartz

eyes are locally present, and hornblende generally exceeds biotite in abundance. This dacite flow is referred to as "F-2." The unit is up to 75 meters thick.

The middle unit of the Kate/Alta transition is a fragmental crystal tuff. It locally contains abundant coarse plagioclase phenocrysts and fine hornblende and pyroxene. Evidence of devitrified glass is seen in thin section. Both coarse and fine grained, more densely welded(?), varieties are present. This is the lowest crystal tuff unit presently recognized in the Flowery district. The unit is up to 30 meters thick.

The uppermost unit of the Kate/Alta transition is a densely welded crystal tuff of probably andesitic composition. The unit contains fine grained phenocrysts of plagioclase, hornblende and pyroxene. The true thickness of the unit cannot be determined as the upper contact of the densely welded tuff is an angular unconformity with the overlying basal unit of the Kate Peak Formation. The maximum exposed thickness is about 55 meters.

The basal unit of the Kate Peak Formation, as defined in the current study, is a distinctive cobble to boulder fragmental unit. Propylitic alteration effects are less pronounced in the basal fragmental unit and succeeding Kate Peak flows than in underlying lithologies of both the transitional and bedded Alta units. The fragments are sub-rounded and generally of a monolithologic dacitic composition. Fragments commonly range up to about 0.5 m in diameter. The matrix generally comprises about 20 percent of the rock and is also of dacitic composition. Thin lenses of bedded sand to silt sized material and possible narrow (up to 10 cm) sandstone dikes are locally present and suggest a sedimentary origin for the unit. Maximum exposed thickness in the Flowery district is about 210 meters. The basal fragmental may be of regional extent as a similar lithology is found in outcrop near Virginia City and on the lower, western slopes of the Geiger Grade.

The stratigraphy of the Kate Peak Formation above the basal fragmental is dominantly a series of dacitic crystal tuffs. Most are moderately to strongly welded with generally abundant crystals of plagioclase and

hornblende. The flows are internally variable and are locally fragmental. Grain sizes range from fine to coarse. Some of the flows are not laterally persistent, and as many as five flows may have an aggregate thickness of only 235 meters.

Intrusive Rocks

Intrusive rocks are present throughout the Flowery district. Many of the intrusive rocks are texturally and compositionally similar to the flows of the host rocks and are recognized as dikes based on map patterns, differences in intensity of alteration, or chance exposures of definitive contacts. Age relationships are in some cases indeterminate due to the absence of certain types of intrusive rocks in some portions of the Flowery district.

Shallow plutonic rocks are exposed in the North Bonanza area and have been penetrated by drill holes and mine workings in the Pet-Lady Bryan area. The rocks are fine to medium grained, equigranular granitic rocks. The rocks appear to range from granodiorite to quartz monzonite in composition, but propylitic and argillic alteration locally obscures primary mafics and feldspar ratios. Plutonic rocks in outcrop in the North Bonanza area contain up to 30 percent interstitial quartz. Such "quartz monzonitic" rocks clearly intrude the volcanoclastic unit of the Alta Formation in North Bonanza canyon. The clastics here contain fragments of a more mafic-rich, lower quartz content rock that is similar to the "granodiorite" found in the Pet-Lady Bryan area.

The plutonic rocks are spatially restricted to the footwall of mineralization, and are themselves cut by quartz veins and alteration related to the mineralization episode. This spatial and age relationship is similar to that observed in the Comstock Lode between the Mt. Davidson Granodiorite and the Comstock fault. A genetic relationship may exist between the shallow plutonic rocks and mineralization, but it has not been documented.

An andesitic to dacitic mass lies to the east of the North Bonanza area, and appears to intrude the andesite breccia unit of the Alta

Formation. It is texturally variable but is generally similar to the basal unit, F₂ but no direct evidence is available.

A complex series of fine to medium, dark colored andesitic to basaltic(?) dikes occur throughout the Flowery district. Free quartz is uncommon in these rocks. Abundant textural varieties are present, sometimes within the same outcrop or hand specimen, and some types are indistinguishable from suspected volcanic flows in the volcanoclastic unit of the Alta Formation. Contacts observed in some outcrops and map distributions clearly illustrate that most of these rocks are intrusive dikes. These andesitic basaltic dikes are most common in the Alta and may locally be truncated by the basal Kate fragmental unit. These dikes have intruded at least the lower units of the Kate Peak Formation elsewhere. They are in part referred to informally as part of the sequence of "Kate" dikes although many of them may possibly be related to an episode of volcanism younger than Alta but older than Kate. Those dikes that clearly cut the Kate Peak Formation may be feeders for upper units of the Kate. Most of the dikes are less altered than the Alta rocks which they intrude, and those in close proximity to mineralization are only weakly bleached, if at all, and are not cut by quartz veins.

Relatively coarse grained dacitic rocks are common in the Six Mile Canyon dike. The phenocryst to groundmass ratio is about 1:1. Plagioclase feldspar is the dominant phenocryst, and hornblende and biotite are present in nearly equal abundance. The groundmass is commonly medium grained. A generally more fine grained intrusive breccia of dacitic to andesitic composition is found along much of the Six Mile Canyon dike. The dike appears to occupy a fault which terminates the southern extension of the Pet-Lady Bryan mineralization. The dike is locally bleached along its margins, but it is not cut by quartz veins. The continuation of the dike to the west has not been completely mapped, but it appears to merge with the intrusive mass of Flowery Peak. It is possible that this dike and others of similar composition represent part of the principal feeder system for upper flows of the Kate Peak Formation. Other coarse grained dikes, with a finer groundmass and a groundmass to phenocryst ratio of about 3:1, appear to belong to the same period of dike emplacement.

Structure

At least two periods of faulting and tilting are present in the Flowery district. The principal evidence for two periods of deformation is the angular unconformity between the basal fragmental unit of the Kate Peak Formation and underlying units of the Alta and transitional package. Most bedded units, with few exceptions, strike in a northeasterly direction and dip to the northwest. Attitudes in the Kate Peak units, however, generally dip 10° to 15° more gently and have a more easterly strike than do the older rocks. On the geologic map of the Flowery district a distinct pinch-out of the Kate/Alta transitional package rocks against the basal fragmental unit of the Kate is evident. The alta and transitional package rocks are assumed to have been tilted to the northwest at about 15° to 20° prior to erosion and later deposition of the Kate Peak units. Subsequent deformation tilted all rock units an additional 20° to 25° to the northwest. Because the tilt axes were somewhat divergent, discrepancies in dip between the units is less than the full amount of the second period of tilting. The tilting is assumed to be the result of rotation of hanging wall blocks on normal faults. The Comstock Lode normal fault is also thought to have had at least two periods of deformation; one prior to and one syn- or post-mineralization. The timing or structural relationship between Flowery district and Comstock Lode deformation is unknown.

The major fault in the Flowery district is now occupied by the Six Mile Canyon dike discussed previously. The mineralization of the Pet-Lady Bryan area terminates against the post-mineral dike. Another problem with the Six Mile Canyon fault is that the dike which marks its trace dies out rapidly to the east, and little evidence of displacement can be found along its eastern projections. Weak bleaching obscures the stratigraphic detail needed to document displacement in the eastern area, but the current working hypothesis is that displacement along the Six Mile Canyon fault gradually decreases to the east.

Other faults in the Flowery district show a similar decrease in displacement from west to east. In "Jeep Trail" canyon north of the Berry Pit a fault clearly offsets lower units of the Kate Peak Formation to the west, but displacements are progressively less apparent as the fault is

traced to the east-southeast. The projection of the fault trace does not have any apparent offset in the area southwest of the North Bonanza workings.

The proposed structural model for the "hinge" faults described above suggests that the zones of most intense mineralization are normal faults with attitudes nearly orthogonal to the hinge faults. The normal faults were permeable structures during mineralization whereas the hinge faults were relatively less permeable conduits for hydrothermal fluids. The intensity of quartz mineralization may reflect the degree of permeability and relative amount of displacement. This model explains the observed displacements and the lack of a faulted continuation of mineralization south of the Six Mile Canyon fault. The footwall to mineralization in both the Pet-Lady Bryan-Berry and North Bonanza areas is interpreted to be a coherent structural block. The two mineralized areas are not offset fragments of a single mineralized structure. Further speculation on the dogleg geometry of the hinge fault-normal fault system suggests that the epizonal plutons may have mechanically influenced the observed fault pattern. The hanging walls of the normal faults may be thought of as blocks of less competent host rock which slid off the eastern flanks of the competent mass of the plutons. The irregular fault geometry is thus a reflection of the irregular shape of the eastern flank of the pluton.

Hydrothermal Alteration

Hydrothermal alteration in the Flowery district consists of propylitization, bleaching and silicification. Propylitization is recognized as a regional, background alteration developed in the Alta Formation. Local propylitic effects are recognized in the Kate Peak Formation as well. Bleaching is confined to the zone of oxidation within the Alta Formation at Flowery and is generally associated with areas of silicification, brecciation and Au-Ag mineralization. At variable depths below the zone of oxidation a hypogene alteration assemblage is recognized that consists of quartz-pyrite and a grey-white micaceous/sericitic mineral. Detailed mapping of alteration and mineralization was conducted and compiled at 1:1000 metric and reduced to 1:2400 (1" = 200') (Plate II).

Propylitic

Widespread regional propylitization around Virginia City and Flowery is characterized by epidote and albite replacement of plagioclase and chlorite, calcite and epidote alteration of ferromagnesian mineral (Coats, 1940).

Whitebread (1976) recognizes propylitic assemblages of montmorillonite-calcite-quartz±chlorite±pyrite which may be transitional to argillic zones of alteration. Propylitic alteration in the Flowery district consists predominately of epidote, chlorite and calcite assemblages in coarse tuff breccias, argillaceous to sandy clastics and porphyritic andesite dikes and flows of the Alta Formation. Rocks are usually light grey to dark green and locally contain disseminated pyrite to five or six percent. Propylitically altered Alta rocks at the periphery of the bleached and silicified zone at Flowery contain disseminated pyrite (less than 1% to 10%) that define an irregular and discontinuous halo localized at the edge of the main zone of silicification and bleaching. Propylitization is also recognized as isolated pods within the intensely bleached zone where effects of silicification and bleaching are completely absent. Propylitic alteration locally grades into fresh Alta rocks which are characteristically dark grey to black. Two varieties of propylitic alteration recognized in the Virginia City area may represent (1) widespread propylitization associated with Alta and possibly Kate Peak volcanic activity, and, (2) localized calcite and clay-rich (montmorillonite) assemblages overprinted on syn-regional propylitic alteration (Whitebread, 1976). The Davidson Granodiorite has been proposed as a potential source (Coats, 1940) for regional propylitization as no other geometric association with veins or obvious channels is apparent. In the Flowery district granodiorite on the dump near the Lady Bryan shaft is virtually fresh and contains only traces of chlorite, epidote and pyrite. Clasts of texturally and mineralogically similar igneous rock types in the coarse flow breccias of the Alta Formation show abundant epidote-chlorite alteration and usually disseminated pyrite to five percent. Granodiorite in FL-4 (70 m northwest of the Lady Bryan shaft) contains abundant epidote, clay (montmorillonite?) and pyrite (6-8 percent). It is inferred that most of the propylitic alteration at the periphery of the bleached zone at Flowery is related to

the district-wide propylitization. Propylitic alteration may have been centered around a linear structure that may have provided a subsequent channel for silicification and precious metal deposition. A genetic association with the underlying "Flowery granodiorite" is possible. "Propylitic" features recognized in rock chips from drill holes may be related to a more localized and later alteration episode genetically and spatially related to alteration zones symmetrically arranged around the Flowery Lode.

Quartz-Mica-Pyrite

A consistent light grey alteration assemblage of quartz-pyrite and a white-grey micaceous mineral (sericite?) are recognized at variable depths in drill holes FL-3, FL-9, FL-7, FL-8, FL-6, and FL-4 usually restricted to the footwall of the Flowery lode. Exposures east of the Berry Pit and drill hole intercepts in FL-6 in the hanging wall porphyritic andesite display generally weak alteration and contain presumably propylitic mineral assemblages. Drill holes FL-9 and FL-7, drilled entirely within the footwall zone, contain the quartz-pyrite-sericite assemblage immediately below the zone of oxidation and bleaching beginning at depths ranging from 20 to 50 feet below the surface. A zone of overlap between oxidation and hypogene quartz-sericite alteration is common. It appears that at least in the area of the Lady Bryan Pit supergene alteration and oxidation were superimposed on this pervasive alteration assemblage. X-ray results suggest that the micaceous assemblage may consist of sericite/disordered mica and pyrophyllite. The footwall quartz-"sericite"-pyrite assemblage at Flowery is cut locally by large isolated quartz veins and zones of intense quartz vein sheeting and stockwork. Varieties of Alta clastics and locally porphyritic andesite have been altered to this assemblage in the footwall zone. Original textures are commonly obscured.

Bleaching

Bleaching of Alta host rocks appears to be a widespread phenomena in the immediate vicinity of the principle zones of silicification. The area

of bleaching trends east-west and extends for approximately 3000 feet encompassing two main areas of silicification at the Lady Bryan-Berry (west end) area and the North Bonanza (east end) Mine. The zone is 1000 to 1500 feet wide. A similar area of bleaching continues to the east, however, it is not spatially related to specific silicified zones. Bleaching within the area is somewhat irregular and patchy. Exposed outcrops usually display variable intensities of alteration that range from incipient oxidation to areas of mixed oxidation, hypogene argillic alteration, and supergene bleaching. Bleached rocks are formed during supergene leaching by acid waters formed by the oxidation of pyrite in underlying rocks. The erratic nature of bleached areas may be the result of either the presence of local zones of propylitically altered rock with little or no pyrite, or variable rock permeabilities associated with local fracturing and quartz veining. Bleaching is commonly recognized in zones proximal to quartz veining. The veins probably provided structural access for solutions but the adjacent bleaching may not be true alteration selvages. Minerals such as pyrophyllite, alunite, hydromica, montmorillonite, and kaolinite are recognized in bleached assemblages. Areas of bleaching associated with quartz breccias and veining may be hypogene argillic assemblages. Since clay minerals characteristic of both supergene and hypogene environments are common in these bleached rocks, a definitive interpretation is not possible. The presence of pyrophyllite in some of the bleached surface samples implies a hypogene origin.

Areas of bleached rock not spatially associated with quartz veins may reflect supergene leaching of oxidized pyrite from either propylitic or hypogene quartz-sericite assemblages. Contacts on the surface between bleached rock and unaltered or propylitized rock are sharp. Supergene bleaching usually diminishes within 15 to 20 meters of the surface. Bleached rocks are commonly cream-white. Fractures and quartz veins are usually coated with red-orange, yellow and brown iron oxides. Original rock textures are commonly obscured. Relict white feldspar phenocrysts suggest porphyritic andesite flows, dikes or porphyritic fragments within coarse clastic tuff breccias of the Alta Formation. Similarly, uniform sugary and granular fine grained bleached rocks probably represent originally fine grained tuffaceous Alta sediments.

Intense bleaching in the North Bonanza quartz monzonite has locally produced an aggregate of white clay, sericite and quartz in characteristic equigranular textures. However, widely altered and oxidized exposures in the canyon bottom do not contain significant pyrite. This bleaching may not all be related to supergene oxidation of pyrite. Local areas of gypsum are recognized in bleached zones located usually near the outer limits of bleached rock near the contact with propylitic alteration. Gypsum is found as fracture coatings and isolated veins usually in areas of supergene bleaching where a visible soil has developed over the bleached rock. It does not appear to be related to main-stage quartz veining or silicification.

Silicification

The most prominent and extensive zones of silicification are found in the Lady Bryan-Berry and North Bonanza areas of the district. Silicification is characterized by quartz breccia, sheeted and stockwork quartz veining, and local silica flooding.

In the Lady Bryan-Berry (west end) area the main lode extends approximately 300 m along its N20-35E trend. The main zone of silicification is approximately 40 m wide and dips to the SE at about 55°-65°.

Quartz breccia is the most common type of silicification in the lode. Massive zones of quartz within the lode form prominent topographic ledges and outcrops. Isolated quartz veins, sheeted quartz veins, and quartz stockwork are found in the footwall volcanics. These zones form a band ± 30 m wide adjacent to the lode. Quartz veining can be found as far as 200 m west of the footwall contact. The footwall stockwork locally grades into the breccia. Quartz breccia is commonly present in the footwall and pods of rock-rich quartz stockwork can be found within brecciated parts of the lode.

In the Pet Mine area the quartz breccia commonly consists of vuggy quartz veins with locally terminated and intergrown quartz crystals. Lithic fragments are usually subrounded and rotated and are cut by an

apparent early set of hairline quartz veinlets as well as late vuggy quartz veins probably related to main stage brecciation. Fragments from 1-10 cm constitute from 20 to 70 percent of the typical breccia and consist of fine grained clastic and porphyritic andesite of the Alta Formation. Fragments are rarely bleached. Lithic fragments appear as minute (less than 1 cm) shredding or wispy flakes of rock where they constitute less than 20 percent of the breccia. Locally parts of the breccia are composed of zones of massive white quartz. Larger fragments 4-5 cm in diameter commonly act as nucleating centers for coarsely crystalline quartz growth. Large terminated quartz clusters that crystallized in open spaces within pockets and veins characterize much of the zone of silicification and bleaching.

In the Berry Pit, mixed brecciation, flooding and quartz veining are found within the contacts of the lode. Most of the Berry Pit and essentially all of the Lady Bryan Pit have been excavated within the footwall zone. At the eastern edge of the Berry Pit isolated outcrops of silicification appear to trend east-west.

About 170 m east of the Berry Pit the silicified and brecciated outcrops become more pronounced. In this area the quartz breccia zone is about 20 m wide. This zone terminates along the N85E trend adjacent to quartz monzonite about 400 m east of the Berry Pit. A more diffuse and irregular continuation of the silicification is recognized 170 m southeast of this location. From here, a rough approximation of the overall trend is N50E toward the North Bonanza Mine workings. Outcrops along this zone are characterized by abundant quartz stockwork and flooding within a light grey porphyritic andesite. The quartz breccia changes strike abruptly to approximately north-south at the North Bonanza canyon as it appears to follow the quartz monzonite/Alta Formation contact. A similar zone 10-15 m thick trending north-south extends for at least 200 m northeast of the North Bonanza Mine. Characteristic "silicified" textures in the North Bonanza area include massive quartz, stockwork quartz veins and quartz breccia. Footwall quartz stockwork at North Bonanza locally cuts quartz monzonite. In addition, a distinct quartz breccia rib cuts the quartz monzonite.

Mineralization

Mineralogy

Mineralization at Flowery is associated with zones of quartz brecciation, and quartz veins usually adjacent to areas of bleached Alta. Extensive areas of Au and Ag mineralization are found near the Lady Bryan-Pet mine areas, the Berry open pit and at the North Bonanza Mine. Anomalous base metal mineralization (Cu, Pb, Zn) is present at both ends (Lady Bryan-Berry and North Bonanza) of the lode but is more easily identified as disseminated sulfide minerals in the North Bonanza area. Minerals identified in the Flowery district include galena, sphalerite, chalcopyrite, pyrite and free gold. Polybasite and stephanite, common silver bearing sulfide minerals of the Comstock Lode are believed to be present in the Flowery district as well. Dark grey to black minute disseminated grains in quartz breccia in the Pet area are tentatively identified as Ag-Sb sulfide. An unidentified report submitted by Flowery Gold Mines Company indicated that argentite and gold in pyrite is found. Most metallic minerals at Flowery are associated with quartz. Pyrite is identified in greatest quantities at the surface disseminated in propylitically altered rocks of the Alta Formation. Pyrite occurrences of this kind locally constitute up to 5-8 percent of the rock. Pyrite forms an irregular halo up to 250 m in width around the zones of bleaching and silicification. Pyrite is also found at depth and usually disseminated within the altered footwall rocks of the quartz lode in the Lady Bryan-Pet-Berry area. The quantity of pyrite (up to 10-15%) and association with quartz stockwork and quartz-sericite alteration suggest it may represent a distinct episode of pyrite mineralization closely related to main stage precious metal mineralization and alteration processes. Pyrite is also recognized in the Lady Bryan granodiorite in the footwall side of the lode at depth.

Gold was identified in panned concentrates from sluice material collected from discarded reverse circulation drill chips. It commonly occurs as minute (up to 1 mm) disc shaped flakes and as tiny "wire" strands. Free gold is sometimes recognized intergrown with quartz. Potential host rock types from FL-4 for gold mineralization include the

quartz breccia, altered footwall Alta with quartz stockwork, and possibly the granodiorite. Traces of galena and possibly sphalerite were identified in quartz veins from the lode in FL-6 near the Pet Mine. Chalcopyrite, sphalerite and galena are more common on dump materials from mines in the North Bonanza area.

Trace Element Geochemistry and Rock Chip Channel Sampling

In 1980 single specimen samples were collected within and adjacent to the Flowery lode (Pet-Lady Bryan area) as a part of the detailed mapping program. These rocks were analyzed for Cu, Pb, Zn, Mo, Ag, Fe, Au, As, and Hg. Detailed results can be obtained in Flowery geochem files. These analyses represent selected grab samples and their grouping into the three principle zones are based on distance from the lode and the associated with various types of silicification (Table 1). Some generalizations concerning trace metal abundance trends are relevant. Copper, lead, and zinc values show a positive correlation with the zones of silicification related to proximity to the lode. Molybdenum appears to increase in propylitic and bleached types of alteration that are located a significant distance from the main lode. Values near the high end of the range are commonly associated with bleached volcanics. In the Lady Bryan-Pet area silver and gold values increase and percent Fe decreases toward the Flowery quartz breccia. It is apparent that Ag, Au and Fe show a broad and erratic range of values within the lode.

A 35 element semi-quantative emission spectrograph survey of 94 samples collected by a consulting geologist for the Flowery Gold Mines Co. is on file. The significance of the results is uncertain due to the poor descriptive sample documentation.

Rock chip channel-type sampling was conducted in 1979 at the Pet Mine, along the quartz breccia rib north of the Lady Bryan pit in the hangingwall andesite porphyry east of the Berry pit, and along several quartz breccia zones at the North Bonanza area. Samples at the Pet open cut averaged 0.045 oz/ton Au and 1.42 oz/ton Ag for about 57 m. For the same set of samples base metal content ranged from 40-480 ppm Cu, 2029 ppm Mo, ?

TABLE 1

Single sample trace metal abundances
Flowery Lode, altered and silicified volcanics (footwall zones)
Flowery District (Pet-Lady Bryan area)

(Ranges and Arith. Mean)

ppm unless noted otherwise

| Flowery Lode | | | | | | | | | |
|--------------|--------|--------|------|---------|---------|-----------|------|--------|--|
| Quartz | | | | | Breccia | | | | |
| Cu | Pb | Zn | Mo | Ag | Fe | Au ppb | As | Hg ppb | |
| 71-340 | 33-650 | 70-740 | 4-35 | 3-1,075 | .4-2.75 | 25-25,000 | 3-30 | 10-60 | |
| (170) | (260) | (220) | (5) | (125) | (1.10) | (2,770) | (15) | (28) | |

Flowery Footwall Zone
- Bleached Volcanics with
quartz stockwork
(≤ 15 m. from lode)

| | | | | | | | | | | | |
|-----------------|-----------------|----------------|-------------|----------------|-------------------|-------------------|--------------|---------------|--|--|--|
| 24-270 (130) | 66-740 (260) | 9-520 (185) | 1-54 (7) | .6-156 (30) | .4-2.70 (1.35) | 10-2,850 (360) | 5-42 (19) | 10-50 (28) | | | |
|-----------------|-----------------|----------------|-------------|----------------|-------------------|-------------------|--------------|---------------|--|--|--|

Propylitically Altered & Brecciated
Alta Clastics & Andesite Porphyry
- Unsilicified distal part of system
(≈ 200 m. from lode)

| | | | | | | | | | | | |
|----------------|----------------|----------------|--------------|---------------|--------------------|----------------|----------------|--------------|--|--|--|
| 22-220 (70) | 18-141 (50) | 15-177 (95) | 1-55 (20) | .4-7.0 (2) | .75-2.95 (2.25) | < 5-35 (15) | < 2-35 (13) | 5-45 (20) | | | |
|----------------|----------------|----------------|--------------|---------------|--------------------|----------------|----------------|--------------|--|--|--|

40-600 ppm Pb and 100-310 ppm Zn. All samples were from quartz and quartz breccia zones and represent the typical high silver-low gold values of the Pet Mine. A sample traverse was made at right angles to the lode across the North Rib into the coarse Alta tuff breccia and andesite porphyry of the footwall. The only significant mineralization was found in the Alta footwall zone near the contact with the lode. A twenty foot zone ran 0.276 oz/ton Au and 0.42 oz/ton Ag. A channel traverse in 1980 across the same zone gave 12 m (39.4 feet) of 0.295 oz/ton Au and 0.16 oz/ton Ag. Gold and silver mineralization are not recognized in the quartz lode in this area. Here is it typically massive white quartz with a low (less than 10%) rock fragment content. The propylitically altered hangingwall porphyry east of the Berry Pit showed no significant base or precious metal values. Most channel samples at the North Bonanza area across silicified breccia outcrops ran less than 0.02 oz/ton Au and 0.3 oz/ton Ag with one or two ten foot ore grade samples. One ten foot sample contained 0.13% lead. Massive quartz-galena-chalcopyrite and pyrite from the North Bonanza dump ran 18,300 ppm Cu, 2.92% Pb, 8.90% Zn, no moly, 7.84 oz/ton Ag and 0.043 oz/ton Au. Old reports indicate that the galena at North Bonanza was an argentiferous variety.

Extensive rock chip channel sampling within and adjacent to the lode was undertaken in the spring and summer of 1980. Minor sampling was undertaken in 1981. The survey area covered the principle accessible outcrops along the lode in both the Lady Bryan and Berry glory hole areas. All analyses for the rock chip channel sampling program were done by Hunter Mining Laboratory Inc. of Sparks, Nevada. Average channel distances were three meters.

Cumulative linear channel traverses in the Lady Bryan-Pet mines areas that total 204 m averaged 0.045 oz/ton Au and 1.81 oz/ton Ag (fire assay). Cumulative traverses in the Berry glory hole were 180 m that averaged 0.081 oz/ton Au and 0.038 oz/ton Ag. Zones of brecciation and silicification in the south rib area (south of Lady Bryan pit), the north rib (north of Lady Bryan pit) and assorted and discontinuous outcrops southeast and east of the Berry pit did not show any significant Au or Ag mineralization. A summary channel sample map is included in this report (Plate III).

Drilling

A total of two diamond drill (FL-1 and FL-2) and 20 reverse circulation holes (FL-3 thru FL-31) were drilled in two separate programs in 1980 and 1981. A total of 9524 feet (includes 104 feet of diamond drilling in 1980) was completed in April, 1981. A drill hole location map (Plate IV), generalized logs with assays, and geology and assay sections are included in this report. Silver and gold values are color coded. Most silver values reported in oz/ton have been converted from ppm.

Fourteen reverse circulation holes within the Pet-Lady Bryan area contain significant mineralized intercepts that may constitute an economic resource in an open pit mining configuration. These holes (FL-3, FL-6, FL-7, FL-8, FL-9, FL-12, FL-18, FL-20, FL-21, FL-22, FL-24, FL-26, FL-30, and FL-31) cover an area within the lode and footwall zones approximately 300 by 400 feet within which mineralization occurs at depths that range from surface to about 200 feet. Twenty five percent of the footage (4055 feet) in this area averages 0.077 oz/ton Au and 0.60 oz/ton Ag. A tentative, inferred ore reserve in the Pet-Lady Bryan zone is 1 to 1.5 million tons of 0.045 oz/ton Au (entire hole averaged) and 0.60 oz/ton Ag. The potential ore zone is open to the west (see sec. 10,300N) and east along the down dip extension of the main lode (see sec. 10,250N). Limits to the north are based on low Au values (see sec. 10,350N and 9,000E) and to the south by a post-mineral Kate Peak dike (see 1:2400 geology map).

Sampling

Samples at each drill site were collected at five foot intervals through a rotary splitter. Sample weight averaged 20 to 30 lbs. Samples were usually wet from pumped drill water and in several holes from the intercepted water table.

Collection was made in five gallon plastic buckets. After being allowed to settle at the site (with the use of flocculent), they were sealed and stored in the Anaconda warehouse in Sparks. Additional clear water was siphoned off at the warehouse. The sample was transferred into

shallow pans and dried for about 12 hours in a large industrial oven. Dried samples were then transferred into plastic bags, weighed and shipped to Bondar-Clegg (Lakewood and Vancouver).

At the lab the total sample (± 20 lbs) was crushed to 1/16 inch. After several half splits approximately 2.5 lbs was crushed to -80 mesh, split again and crushed to -200 mesh (1.25 lbs) from which one sample was cut for Au (full assay ton) fire assay and Ag analysis by atomic absorption.

LIST OF MAPS AND DATA

- | | |
|--|-----------|
| (1) Claim Map | |
| (2) Regional Geology (1:10,000) | Plate I |
| (3) Detailed Geology (1:2400) | Plate II |
| (4) Rock Chip Geochem Summary Overlay (1:2400) | Plate III |
| (5) Drill Hole Location Plan Map (1:2400) with sections | Plate IV |
| (6) 6 E-W Sections (Geology and Assay, 1:1000) | |
| 3 N-S Sections (Geology and Assay, 1:1000) | |
| (7) Drill Hole Summary with simplified log and assay results | |

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ADDITIONAL DATA/MAPS AVAILABLE AT THE WESTERN DISTRICT OFFICE, SPARKS, NV

[(1) Geochemistry

1979, 1980 Soil and Rock Chip Geochemistry Surveys
1979-1981 Misc. Rock Chip Channel Sampling Data/Maps

(2) Geophysics

1981 IP Survey with Resistivity
Down Hole Log Surveys
Ground Magnetism Study

(3) Aerial Photos 1:10,000 (color and B&W)

(4) Hazard Elimination Report/File

[(5) Colt-Norwich Option Report

(6) Deterra Mines Option Data

(7) Flowery Gold Mines Co. of Nevada Data/Maps

(8) United Mines Co. Maps (Underground Maps)

L (9) Mine Histories File

(10) 1980, 1981 Variability Studies File

(11) Fluid Inclusion Study, X-ray Diffraction Work

(13) Drill Samples

Coarse rejects, pulps from RDW
5 foot interval drill chips (in plastic vials in BX core boxes)

(14) Topographic Base Maps (mylar)

1" = 2000', 1" = 1000', 1:1000 metric, 1:10,000 metric

REFERENCES

- Coats, R. R., 1940, Propylitization and related types of alteration on the Comstock Lode (Nevada): Econ. Geology, v. 35, No. 1, p. 1-16.
- Whitebread, Donald H., 1976, Alteration and geochemistry of Tertiary volcanic rocks in parts of Virginia City Quadrangle, Nevada: U.S. Geological Survey Prof. Paper 936; 43 p.

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Item 239

SCALE 1" = 400'

Note the Virgin area

