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FILE

White Elephant Property
Sec. 16, 20, 21, 29, 30
T. 29N, R18W
White Hills Area
Gold Basin Dist
Mohave Co, AZ

WHITE ELEPHANT PROPERTY

Mohave County, Arizona

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ECM, Inc.
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Location - The White Elephant property is located in the White Hills of northwestern Mohave County, Arizona. It lies approximately 80 miles southeast of Las Vegas, Nevada and 65 miles north of Kingman, Arizona. The property is wholly within Sections 20 and 30; T29N, R18W. Access to the area from U.S. highway 93 is by way of the Pierce Ferry road for about 22 miles and then the Hualapai Wash road for another seven miles. Numerous four wheel-drive vehicle roads and trails in washes provide access on the property itself.

The White Elephant property is located on the Garnet Mountain and Senator Mountain 15-minute topographic sheets.

Land Status - The property consists of 72 lode claims (PAT 1-72) that were located in April, 1989. PAT 1 through PAT 36 are located in Section 30, and PAT 37 through PAT 72 are in Section 20. The property is situated within a checkerboard of Santa Fe Pacific Land Co. holdings that normally includes the odd-numbered Sections. Numerous lode and placer claims are located in all directions around the White Elephant property for at least several miles.

Historic Activities - The White Elephant property is within the Gold Basin mining district. Gold was first discovered there in the early 1870's. Production records from the 1870's to 1900 are non-existent, but from the amount of ore extracted from at least six different mines, an estimated 25,000 to 50,000 ounces of gold were produced. Recorded metal production for the period from 1901 to 1942 is nearly 15,000 ounces of gold. Since that time there was probably another couple of thousand ounces recovered, mainly from the richer portions of extensive low-grade placer deposits.

The Gold Hill mine, located about a mile northeast of the White Elephant property, was a producer of gold ores from 1930 to 1942. Ore from the mine was probably treated at the Malco mill, a cyanide-flotation plant designed to extract gold from sulfide ores. Some of the ore at the Gold Hill mine was mined from a strand of the northeast trending White Elephant shear zone, a geologic feature that will be discussed later in this report.

Small-scale placer mining occurred on and immediately adjacent to the White Elephant property. Source(s) for this gold is not readily apparent though mineralized veins and altered zones along the large White Elephant shear zone are strong suspects. Small prospect pits and trenches are widely scattered along this extensively covered structural zone indicating the past search for lode deposits.

General Geology - The Gold Basin mining district is in the southern Basin and Range province, approximately 15 miles west of the southwestern edge of the Colorado Plateau. It is in an uplifted region of structurally complex Early Proterozoic basement rocks located near the leading edge of the North American Precambrian crustal plate. It also coincides with the Paleozoic miogeoclinal hinge zone and the Mesozoic Sevier orogenic belt. The northwest trending grain of the Walker Lane tectonic feature as well as the Las Vegas shear zone project into the Gold Basin area.

A thick and complexly deformed sequence of Early Proterozoic (1.7-1.8 b.y.) gneisses and schists dominate the geologic picture in the Gold Basin district (see accompanying regional geologic map). Biotite bearing quartzofeldspathic gneiss is the most common rock type. It indicates a probable protolith largely consisting of graywackes with subordinate amounts of arkosic clastic sediments. Kyanite-biotite-quartz gneiss and sillimanite bearing gneiss and schist interlayered with the biotite quartzofeldspathic gneiss probably represent more alumina-rich pelitic sequences that were originally interbedded with the coarser grained graywackes. Pelitic schist and gneiss also includes a garnet-biotite-quartz-feldspar assemblage.

Biotite-muscovite-quartz schist and biotite-amphibole schist are sporadically present in the gneissic terrane. Many of these rocks contain a high carbonate content that appears to be an Fe-rich variety. Retrograde metamorphic affects and hydrothermal alteration have converted many of these rocks into chlorite-magnetite rich schists. These mafic schists are believed to represent original volcanic tuffaceous materials deposited in an Early Proterozoic volcanotectonic basin along the edge of the North American craton.

Lesser quantities of quartz-sericite schist, tourmaline-rich schist, metachert, and banded iron formation are also included in the gneissic terrane. These units probably represent original chemical sediment components mixed with variable amounts of felsic volcanic tuffaceous material and hydrothermal muddy sediments.

Intermixed with the more dominant gneisses and schists in the Gold Basin district are numerous amphibolite bodies that are mainly conformable with the layering in the surrounding lithologies. The amphibolites are extremely variable in size and shape, and they have a highly erratic distribution within the gneissic terrane. Relict textures and overall shapes indicate most amphibolite was derived from igneous protoliths, probably gabbroic and pyroxenitic sills and dikes. Most show some degree of preserved chilled margins against the enclosing rocks. Some amphibolites (especially more schistose varieties) are undoubtedly representative of a sedimentary protolith.

Another important suite of intrusive igneous rocks in the Gold Basin district are gneissic granodiorite and gneissic diorite plutons. These well-foliated rocks were intruded into the paragneiss and orthogneiss or their protoliths sometime before major dynamothermal metamorphic events were completed. These rocks display an interesting spatial relationship with a significant number of gold bearing vein deposits, suggesting the possibility of some genetic link.

A large mass of porphyritic monzogranite was intruded into the gneissic terrane at about 1.6 b.y. ago. The exposed levels of this pluton were not deformed syntectonically during the main metamorphic event of the region. Thus peak, upper amphibolite-facies were developed prior to 1.6 b.y. ago. A biotite-rich border facies appears to define the contact zone for large portions of this intrusive complex. The porphyritic monzogranite hosts gold bearing quartz veins located along northeast as well as northwest striking fissures and fractures.

Another type of pluton of certain Proterozoic age consists of foliated leucogranite that normally occurs as conformable bodies interlayered with the gneissic rocks. Textures in these rocks grade from medium grained equigranular to pegmatitic. Some leucogranites have an intense mylonitic fabric, and those near some of the gold prospects contain pale pink garnets.

A Cretaceous age (72 m.y.) peraluminous two-mica granite has been intruded into the Proterozoic rocks in the southern portion of the Gold Basin district. This pluton normally has sharp contacts with the surrounding metamorphic rocks. Several minor facies variations that occur within this pluton are depicted by overall grain size contrast and changes in its porphyritic nature. Some syenitic zones are also present and usually show enrichments in muscovite, K-feldspar, and fluorite. Quartz-pyrite-muscovite veins with related carbonate and fluorite enrichment have formed in some of the syenitic rocks.

Overall, the geologic structure in the Gold Basin district is poorly mapped and therefore even more poorly understood. The White Hills, themselves, are separated from the Lost Basin Range to the east by a major basin-and-range fault called the Hualapai Valley fault. It trends mainly north-south on the east side of the White Hills, but swings toward the southeast on the east side of the southern White Hills. The east side of the Hualapai Valley fault is probably down-dropped relative to the west side.

Within the White Hills the dominant fault and shear zone trends appear to be northeastward. These structures are probably of ancient (Proterozoic?) vintage with numerous reactivations occurring into Tertiary times. Dominant motions were probably strike-slip though significant amounts of dip-slip and oblique-slip movements were also produced along their extents. The White Elephant shear zone, named herein, is probably the major northeast trending structure in the Gold Basin district. This structural zone lies along the north edge of the anomalously straight White Elephant Wash, a topographic feature that is presently cut into older pediment gravels.

Northwest trending and nearly east-west striking faults and shears also occur in the district. Relative displacements across these structures are unknown though locally they may be considerable (+1000's of feet).

One of the major structural features mapped in this region is a low-angle detachment fault extending in a very winding course from the northern end of the White Hills to the extreme south end. This fault crops out mainly along the western margin of the White Hills where it defines the eastern leading edge for low-angle detachment terranes in this part of Arizona and adjacent Nevada. This detachment zone hosts a number of the old producing gold mines as well as significant prospects in the Gold Basin district.

The gneissic rocks exposed in the Gold Basin district contain highly deformed and lithologically complex sequences that can change abruptly over short distances. Highly contorted and isoclinally folded units are present everywhere, indicating the pervasive nature of the deformational stage(s) that occurred sometime during the Early to Middle Proterozoic. Many of the isoclinal folds in the district have northeast trending axes, some, of which, plunge in that direction as well. These were later refolded across northwesterly trending axes into more open-style folds, perhaps during the Laramide or even earlier.

Locally pervasive cataclasite and mylonite can be observed in areas of very strong shearing, such as along the White Elephant shear zone. Such features indicate both brittle-type deformation as well as ductile flow. Many of the gneissic layers, and especially some of the amphibolitic layers, display a pulling apart or boudinage of the original rock fabric. Obviously, these structures were formed at deep crustal levels in the presence of metamorphogenic fluids.

Cover rocks and unconsolidated material overlying the Proterozoic and Cretaceous lithologies consist of a) Tertiary volcanics and intermixed fanglomerate deposits, b) Miocene limestones, claystones, and siltstones, c) younger Tertiary fanglomerate deposits, and d) Recent pediment gravels, talus, colluvium, and sand and gravels in active stream washes.

<u>Local Geology</u> - Rocks exposed at the White Elephant property mainly consist of medium to dark gray, equigranular paragneisses that developed from a protolith dominated by graywacke and arkosic sedimentary rocks. The overall sequence is reminiscent of other Proterozoic-age turbidite-dominated metaclastic basinal assemblages located in the western Cordillera. Minor amounts of cleaner quartzitic rocks interbedded with the gneiss suggest a possible coarsening

and thickening upward sequence, barring a completely overturned section.

The paragneiss unit also changes upward into a sequence of orthogneisses consisting of a lower assemblage of mafic schists that grade upward into much more felsic units. These rocks are considered to be metamorphosed aquagene tuffs. Associated with some of these felsic schists in the SW/4 of Section 30 and NW/4 of Section 29 are ferruginous, cherty-looking rocks that could be recrystallized chemical sediments (i.e. exhalites). The overall thickness of these unique rocks could not be determined, though several individual beds(?) were only about 2 to 6 feet thick. Similar-looking rocks occur at the Gold Hill mine in the NE/4 of Section 16.

The biotite-rich quartzofeldspathic gneiss contains numerous interlayered masses of amphibolite, of which, only the larger masses are shown on the geologic map in N/2 of Section 30. These appear to be several thousand feet lower in the section from the mafic and felsic schists. They are probably metamorphosed gabbroic sills that were emplaced in the graywacke sequence during basin evolution. Retrograde metamorphic effects have caused some chloritization and hematitic alteration of these rocks; whereas, amphibolites caught in the White Elephant shear zone show nearly complete transformation to chlorite schist with variable amounts of associated silicification and Fe-carbonate enrichment.

The general foliation trends in these gneissic and schistose rocks is about N45E with dominant dips to the southeast. Some north-northwesterly dips in Section 19 and the N/2 of Section 20 suggest a possible anticlinal fold in this area, though conclusive evidence for such a feature was not found. On the otherhand, if the amphibolites represent some of the lowermost units in the sequence of gneisses, they may approximate the position of an eroded anticlinal fold hinge.

Intruded into the gneissic rocks in the W/2 of Section 30 is a porphyritic monzogranite. This pluton contains a considerable amount of alteration mainly represented by partially to completely argillized feldspars phenocrysts, chloritized mafic minerals, and a fine network of quartz-Fe-carbonate-hematite- limonite veinlets. This type of alteration is most intense where these rocks have been highly sheared and foliated due to their proximity to major structures.

A number of other intrusive rocks, too small to portray on the geologic map, were observed at the White Elephant property. Many are thin, sill-like bodies of gneissic granodiorite that occur in the E/2 of Section 20. Similar small, tabular to lense-like bodies of leucogranite are interlayered with the paragneisses. These may be spatially related to pegmatite pods of quartz-K-feldspar-muscovite mixtures that are mainly located in the N/2 of Section 20. Both the leucogranites and pegmatites contain limonites that suggest an initial sulfide content of at least 3 volume percent, and, locally, some jarositic outcrops indicate nearly 10 volume percent sulfide associated with some of the intensely sheared leucogranites.

A broad zone, as much as a mile wide in places, contains major northeast trending shears that cut through all the Proterozoic lithologies at White Elephant. This zone appears to be part of a much larger regional tectonic feature that I am calling the White Elephant shear zone because of its location adjacent to and paralleling the White Elephant Wash. The shear zone is mainly characterized by intensely foliated and locally mylonitized gneissic rocks. The main elements of the zone (i.e. master shears) appear to cut diagonally through the central portion of Section 30, and the south-central portion of Section 20. Parallel shears were observed several thousand feet to the northwest, and there are local indications that others are located to the southeast under extensive cover.

Alteration is very impressive along the trend of the White Elephant shear zone. Mylonitized rocks are largely changed into punky mixtures of clays-hematite-carbonate and variable amounts of quartz mixed with sericite and limonite crusts that indicate the former presence of sulfides. Widths for these tectonically-softened rocks are highly variable and difficult to assess because of the recessive way in which they weather. However, several exposures in the central portion of Section 20 show extremely sheared and mylonitized rocks over a cross-strike distance of nearly 200 feet, with the southern edge of the zone still hidden beneath cover.

Alteration and mineralization occurring along the White Elephant shear zone has been examined by prospectors in the past. Several pits in Section 20 expose very intensely silicified and limonite-stained rocks that contain small flecks of visible gold associated with quartz veins and micro-veinlets. The host rocks are mainly chlorite-sericite-Fe-carbonate schists that show abundant small-scale kink-bands, and irregular crenulations. Some thin mafic (amphibolitic?) igneous rocks in the vicinity of the prospects are extremely silicified as well.

In the W/2 of Section 30 the White Elephant shear zone is complicated by northwest trending sets of cross-fractures and a significant amount of low-angle shears and crush zones. These are also altered (quartz-sericite-Fe-carbonate) and have been prospected in the past. Small placer operations were located around these anomalously altered and sheared areas.

Most of the placer mining in the White Elephant Wash area took place in Sections 28 and 29. However, a significant amount of work was also conducted in the SE/4 of Section 20 and SW/4 of Section 21. The gold in these placers could have been derived from the main White Elephant shear zone, though some may have also came from gold-enriched lithologies associated with the mafic and felsic schists and orthogneisses in the same vicinity. Both the White Elephant shear zone and the metavolcanic rocks appear to merge with one another near the eastern edge of Section 20.

Geochemistry - Rock chip sampling conducted at the White Elephant property was focused along the main White Elephant shear zone. A limited number of samples were also collected from rocks within the belt of metavolcanic schists. Due to the reconnaissance nature of the initial examination, and the limited exposures of mineralized rocks, the sampling was mainly random but concentrated in areas where some visually anomalous characteristics (e.g. silicification, limonite-staining, etc.) could be found.

Results from sampling along the White Elephant shear zone indicate a gold-enriched area extending from the NE/4 of Section 30 northeastward across Section 20. Anomalous values range from 100 ppb to over 10,000 ppb Au. The apparent high-grade (+1000 ppb) samples represent rocks containing visual quartz-limonite veins associated with the highly sheared and locally mylonitized gneissic lithologies. Several of these high-grade samples were collected from obviously mineralized rocks found at old prospects.

Gold values along the White Elephant shear zone in the W/2 of Section 30 are surprisingly low since the rocks appear very similar to those containing anomalous gold farther to the northeast. On the otherhand, arsenic values are very anomalous (100-2000 ppm) in the western portion of Section 30, and in a small area near the NE-corner of the same Section. These may suggest some primary zonation of metals along the shear zone, or perhaps even a plunge for the mineral system. Another possibility would be some relationship between arsenic and the porphyritic monzogranite located in the same general vicinity.

The high arsenic areas also coincide with very anomalous amounts of base metals (Cu,Pb,Zn,Sb) and silver. Similarly, the high gold values detected in Section 20 coincide with anomalous molybdenum values (50-600 ppm). These relationships seemingly support the notion that the mineral system located along the White Elephant shear zone is distinctly zoned in a lateral sense, and perhaps is even zoned vertically as well.

The anomalous gold values found in samples from the metavolcanic stratigraphy do not show the same strongly anomalous values for associated arsenic and base metals, except possibly for copper.

The likelihood of geochemical domains related to the various lithologies found along the White Elephant shear zone was not addressed in the preliminary assessment of the property. A much more detailed sampling program would be necessary in order to assess any such relationships. However, it can be safely stated, at this point, that gold enriched rocks show at least some degree of hydrothermal alteration accompanied by a suspected anomalous amount of sulfide minerals as indicated by the abundance and type of limonites that are present. Gold contents of rocks in the shear zone may also be related to several different types of veins.

Quartz-muscovite-Fe-carbonate veins nearly always have anomalously high gold contents. Quartz-limonite (after sulfide) veins may only have high base metal contents, with gold being absent. Quartz-chlorite-Fe-carbonate veins may or may not have high gold contents. In general, there is nearly always some detectable gold in samples that contain at least 5-10 volume percent Fe-rich carbonates.

Finally, there also appears to be a strong relationship between high gold values and rocks containing some amount of leucogranite, especially if it is pegmatitic. This relationship needs further study.

Target Type - At least two target areas are recognized at the White Elephant property. Probably the most obvious is that associated with the White Elephant shear zone. This target area is at least 5000 feet long, and perhaps as much as 15,000 feet in length. The width of the target area probably varies between 1000 and 2000 feet.

Individual targets within the White Elephant shear zone need further refinement. In order to do so, some ideas regarding the type(s) of targets that might be expected should be proposed.

Metamorphogenic gold deposits located along major shear zones are one of the most common types of gold deposits known, especially in Precambrian terranes. These types of deposits normally form in some portion of a major shear zone that facilitated the focusing of large volumes of gold-enriched fluids during the mineralizing process. Typically, such focused flow occurs in dilational zones created by a) bends along the strike of the shear zone, b) separation wedges formed near the junctions with strong cross-structures, or c) where dense networks of extension fractures develop between anastomosing branches of complex shear zones. Focused fluid-flow can also be achieved where a "heat pump" drives the fluid into some brittley-fractured portion of the tectonic zone. All of these conditions can be enhanced when the process of mineralization takes place near the transition between brittle and ductile styles of deformation.

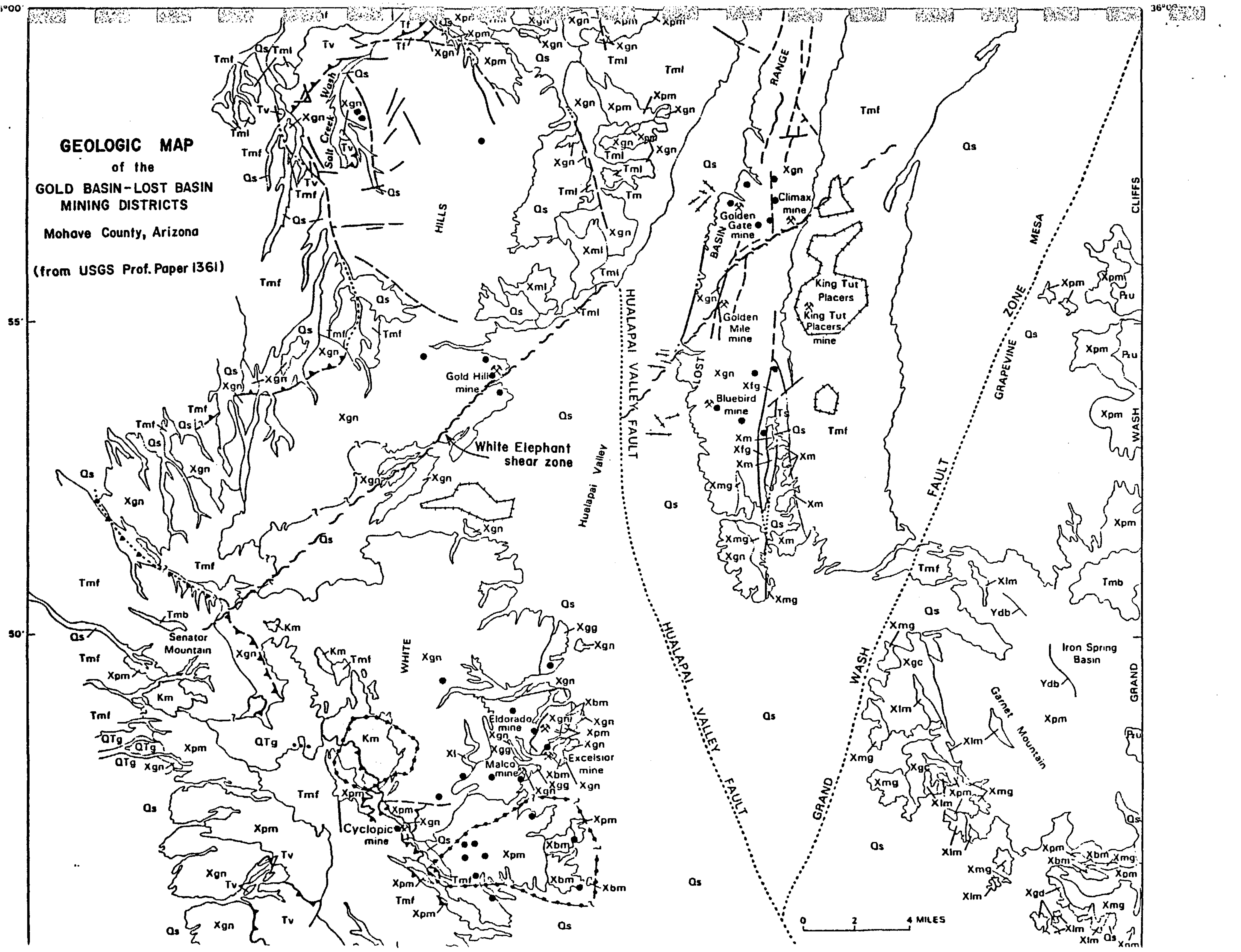
The gold anomalous area situated along the White Elephant shear zone in Section 20 may coincide with both a bend in the zone and a locus of cross-structures. Wrenching along the zone in this area could have created pull-apart extensional areas where fluids from metamorphic dehydration reactions could have been concentrated. Such fluids may have been derived from lithologies containing preconcentrated amounts of gold, such as volcanogenic-hydrothermal sediments or simply other rocks within the shear zone that were mineralized during earlier events. Gold precipitated from metamorphogenic fluids moving through the shear zone was probably accompanied by the formation of sulfides, carbonates, and K-rich silicates. These could serve as diagnostic mineral associations for defining specific targets along the White Elephant shear zone.

The second important target area coincides with the distribution of volcanogenic components in the gneissic terrane. A belt of these rocks has been identified in the SE/4 of Section 30 extending northeastward along the regional strike direction to the SE/4 of Section 20. The same belt of rocks is unmapped farther to the northeast but probably extends to the Gold Hill mine where similar lithologies have been recognized.

Before specific targets can be identified in the belt containing volcanogenic rocks, a detailed lithofacies map will be required. Differentiation between mafic and felsic components as well as probable chemical sediment bearing units should produce favorable target stratigraphy. A further step to target identification would then be to determine the lithogeochemical signatures of the key rock units. Any primary syngenetic, stratiform deposit is likely to have been enriched in other diagnostic elements. Some may have been relatively more mobile than gold in the original ore-forming system, thus leading to halo signatures.

A third, and also quite obvious target area, is where the White Elephant shear zone and the belt of volcanogenic rocks merge together, i.e. the E/2 of Section 20. Interestingly, this area contains a significant amount of leucogranite as narrow, conformable bands within the the intensely sheared gneissic rocks. Felsic pegmatites are also present in the same vicinity. Both the leucogranite and pegmatitic rocks contain anomalous gold contents in this area. Could they represent a gold-enriched metamorphic component derived from a protolith containing preconcentrated amounts of gold?

Finally, the area of anomalous arsenic and base metal values in the W/2 of Section 30 should be more thoroughly evaluated. Specifically, the wallrocks around the porphyritc monzogranite should be mapped in detail and extensively sampled. A possible target type in this setting could be the combined effect of a stockwork of mineralized quartz-muscovite-carbonate veinlets within the intrusive (near its margins), and a gold-enriched fracture system in the contact halo with the surrounding gneisses, schists, and amphibolites.


GEOLOGIC MAP
of the
GOLD BASIN-LOST BASIN
MINING DISTRICTS
Mohave County, Arizona
(from USGS Prof. Paper 1361)
HILLS
WHITE
Salt Creek Wash
RANGE
BASIN
LOST
Golden Gate mine
Climax mine
Golden Mile mine
Bluebird mine
King Tut Placers
King Tut Placers mine
Gold Hill mine
White Elephant shear zone
Hualapai Valley
HUALAPAI VALLEY FAULT
GRAPEVINE MESA ZONE FAULT
GRAND WASH CLIFFS
GRAND WASH FAULT
Senator Mountain
Eldorado mine
Malco mine
Excelsior mine
Cyclopic mine
Iron Spring Basin
Garnet Mountain
55'
50'
36°00'
0 2 4 MILES

DESCRIPTION OF MAP UNITS

Qs Sedimentary deposits (Quaternary)—Includes sand and gravel along active stream washes, talus, colluvium, poorly consolidated fanglomerate currently being dissected, and landslide deposits; also may include extensive high-level fanglomeratic deposits, west of Grand Wash Cliffs in general area of Grapevine Mesa, that may be Tertiary and (or) Quaternary in age

QTg Fanglomerate (Quaternary and (or) Tertiary)—Locally derived fanglomerate deposits that include mostly clasts of metamorphic rock south-southeast of Senator Mountain and that do not contain clasts of rapakivi granite or any interbedded tuffs

Muddy Creek Formation (Tertiary)

Tml Hualapai Limestone Member—Includes limestone interbedded with thin beds of limy claystone, mudstone, and siltstone. Weathered limestone beds have a predominantly reddish color and form steep cliffs where they are dissected by Hualapai Wash

Tmb Basalt—As shown, flows at Senator Mountain, near west edge of map area, and at Iron Spring Basin, near east edge. Basalt in these two areas correlates probably with basalt flows (not shown) that conformably underlie the Hualapai Limestone Member and also are interbedded with fanglomerate of the Muddy Creek Formation near northwest corner of map area. Whole-rock K-Ar age determination of basalt from this area yields age of 10.9 Ma (see section by E.H. McKee, this report)

Tmf Fanglomerate—Alluvial fanglomeratic deposits that include conglomerate, sandstone, siltstone, mudstone, and locally abundant gypsum lenses. Locally includes lenses and beds of rhyolitic tuff and, as shown near southwest corner of map area, fanglomerate mapped previously by Blacet (1975) as unit Tf. Unit is also intruded by minor basalt dikes, especially in general area of Senator Mountain. Near northwest corner of map area, unit includes well-exposed flows of basalt

Tv Volcanic rocks (Tertiary)—Includes mostly andesite. Map unit near northwest corner of map area internally is highly broken by numerous faults, and near here, unit also includes air-fall tuff and reddish-brown sandstone interbedded with chaotic sedimentary breccia composed of fragments of Early Proterozoic gneiss. In places, unit also includes massive porphyritic hornblende andesite and basalt flows and breccia and overall minor amounts of tightly cemented volcaniclastic rocks. Flow layering and bedding generally dip at angles of 35° in contrast with shallow dips of about 5° in unconformably overlying basal fanglomerate of the Muddy Creek Formation. Age ranges of 11.8 to 14.6 Ma are reported near type section of the Mount Davis Volcanics (Anderson and others, 1972), whereas K-Ar age determination on sanidine from air-fall tuff near Salt Creek Wash in northwestern part of area yields age of 15.4 Ma. The volcanic rocks may be equivalent of the Mount Davis Volcanics or the Patsy Mine Volcanics (see section by E.H. McKee, this report).

Ts Rhyolitic tuffaceous sedimentary rocks and fanglomerate (Tertiary)—Includes well-bedded mudflows and rhyolitic tuffaceous sedimentary rocks and minor amounts of fanglomerate. Crops out as steeply dipping sequence of rocks, bounded by north-striking faults, near south end of Lost Basin Range. Possibly equivalent to the Mount Davis Volcanics

Tf Fanglomerate (Tertiary)—Coarse fanglomeratic deposits that locally include landslide or mudflow breccia. Overlain unconformably by fanglomeratic deposits of the Muddy Creek Formation, and apparently intercalated with andesite possibly equivalent to the Mount Davis Volcanics

Ks Two-mica monzogranite (Cretaceous)—Includes mostly highly leucocratic muscovite-biotite monzogranite and some minor amounts of felsic muscovite granodiorite and episyenitic-altered muscovite-biotite monzogranite. Some facies are fluorite bearing. Porphyritic variants contain as much as 5 percent primary quartz phenocrysts. In places, contains very weakly defined primary layering of dimensionally oriented potassium feldspar and biotite

Pu Sedimentary rocks, undivided (Paleozoic)—Includes Cambrian Tapeats Sandstone, Bright Angel Shale, and Muav Limestone

Ydb Diabase (Middle Proterozoic)—Includes normally zoned laths of plagioclase set in very fine grained matrix of granules of opaque mineral(s) and clinopyroxene. Close to chilled margins of some fresh outcrops of undeformed diabase, olivine is found in concentrations of as much as 10 volume percent. Small masses of fine-grained diabase crop out sporadically in Early Proterozoic igneous and metamorphic rocks. Most extensive exposures are about 2 km east of Garnet Mountain. Subophitic textures are dominant. Lower chilled margins of some sills contain sparse hornblende and biotite microveinlets. Presumed to be correlative with the diabase of Sierra Ancha, Ariz., having an emplacement age of 1,150 Ma (Silver, 1963)

Xpm Porphyritic monzogranite of Garnet Mountain (Early Proterozoic)—Includes conspicuous, large potassium feldspar phenocrysts, set in a light-pinkish-gray, coarse-grained hypidiomorphic groundmass. Many exposures show tabular phenocrysts as much as 10 cm long. Some phases are predominantly subporphyritic seriate and show an almost continual gradation in size of their euhedral potassium feldspar phenocrysts. Most widely exposed mass crops out in the general area of Garnet Mountain, in the southeastern part of the area, and extends discontinuously from there to north along the low hills leading to Grand Wash Cliffs. Dated by Wasser-

Xgd Granodiorite border facies of porphyritic monzogranite (Early Proterozoic)—Gray granodiorite that includes variable proportions of biotite, hornblende, quartz, plagioclase, and potassium feldspar. Includes less abundant porphyritic granodiorite and porphyritic monzogranite phases. Locally coarse grained and sparsely porphyritic. Porphyritic phases show potassium feldspar phenocrysts set in coarse-grained hornblende-biotite hypidiomorphic granular matrix that is very magnetite rich. Crops out along west and southwest flanks of Garnet Mountain as mafic border facies of porphyritic monzogranite of Garnet Mountain. Found as homogeneous discrete bodies and also in the mixed granodiorite complex (Xgc)

Xbm Biotite monzogranite (Early Proterozoic)—Includes a homogeneous light-gray, fine-grained monzogranite and some porphyritic facies containing potassium-feldspar and quartz phenocrysts. Crops out south-southeast of Garnet Mountain and in the southern part of the Gold Basin mining district. In southern Gold Basin district, forms host rock for numerous fluorite-bearing, quartz-carbonate veins, presumably Late Cretaceous in age, some of which contain visible gold

Xlm Leucocratic monzogranite (Early Proterozoic)—Typically light-yellowish-gray rock and generally nonporphyritic. Partly chloritized biotite makes up less than 5 percent of most outcrops. Crops out as discontinuous, lensoid masses along western front of Garnet Mountain. Where well exposed, contacts with porphyritic monzogranite of Garnet Mountain (Xpm) show irregular dike offshoots of porphyritic monzogranite of Garnet Mountain cutting leucocratic monzogranite

Xgc Mixed granodiorite complex (Early Proterozoic)—Composite unit that includes mainly granodiorite (Xgd), some of which is porphyritic, and porphyritic monzogranite of Garnet Mountain (Xpm). Also includes some leucocratic monzogranite (Xlm)

Xgg Gneissic granodiorite (Early Proterozoic)—Generally, well-foliated, medium-gray-green rock containing highly variable alkali feldspar to plagioclase ratios. Biotite makes up about 20 volume percent of unit. Crops out in elongate body in southern White Hills

Xl Leucogranite (Early Proterozoic)—Includes coarse-grained leucogranite to pegmatitic leucogranite that contains potassium feldspar phenocrysts as much as 8 cm wide. Largest mass is 1-km-long sill cropping out 3 km northeast of Cyclopic mine. Stringers several centimeters wide parallel layering throughout much of the gneiss (Xgn). Fabrics grade from relatively undeformed to intensely mylonitic. Northeast of Gold Hill mine, large sills of pegmatitic leucogranite increase in abundance and eventually grade into complexes of migmatitic leucogranite (Xml). Most facies show modal compositions that plot in the field of granite; some outcrops of gneissic leucogranite contain garnet

Xfg Feldspar gneiss (Early Proterozoic)—Generally, light gray to light pinkish gray; compositionally homogeneous and typified by a strongly lineated fabric. Includes minor amounts of amphibolite, mafic gneiss, highly crenulated quartz tourmaline schist, and tourmalinite. Crops out in a 5-km-long and 0.8-km-wide sliver, bounded by faults in southern Lost Basin Range. Cut by quartz-feldspar veins, some of which contain gold

Xml Migmatitic leucogranite complex (Early Proterozoic)—Composite unit that includes swarms of leucogranite (Xl), aplite, and pegmatite dikes, together with pegmatoid quartz veins all cutting gneiss (Xgn). Complex and highly deformed by a ductile (mylonitic and gneissic) style of deformation

Xgn Gneiss (Early Proterozoic)—Includes variably metamorphosed gneiss and some metaquartzite in northern parts of the Lost Basin Range, and in northern White Hills. Exposed sequence of gneiss in southern parts of the Lost Basin Range includes abundant metabasite and amphibolite consisting partly of metagabbro, metaclinopyroxenite, metawehrlite, metadiabase, and metabasalt. Intruded to varying degrees by porphyritic monzogranite of Garnet Mountain (Xpm), biotite monzogranite (Xbm), leucocratic monzogranite (Xlm), leucogranite (Xl), and diabase (Ydb)

Xmg Migmatitic gneiss (Early Proterozoic)—Composite unit that includes mostly gneiss (Xgn) intruded to varying degrees by porphyritic monzogranite of Garnet Mountain (Xpm), biotite monzogranite (Xbm), and granodiorite (Xgd)

Xm Migmatite (Early Proterozoic)—Composite unit that includes mostly medium-grained, sparsely porphyritic monzogranite of Garnet Mountain (Xpm) complexly intruded into gneiss (Xgn)

?Contact—Queried where location uncertain

Fault—Dashed where approximately located; dotted where concealed

? Detachment fault—Dashed where approximately located; dotted where concealed; queried where uncertain. Sawteeth on upper plate

● Lode-gold locality—Collected for this report or observed (see Blacet, 1975; and section by J.C. Antweiler and W.L. Campbell, this report)

? Fluorite occurrence—Outer limit observed either in veins or disseminated in the Late Cretaceous two-mica monzogranite; dashed where approximately located; queried where uncertain

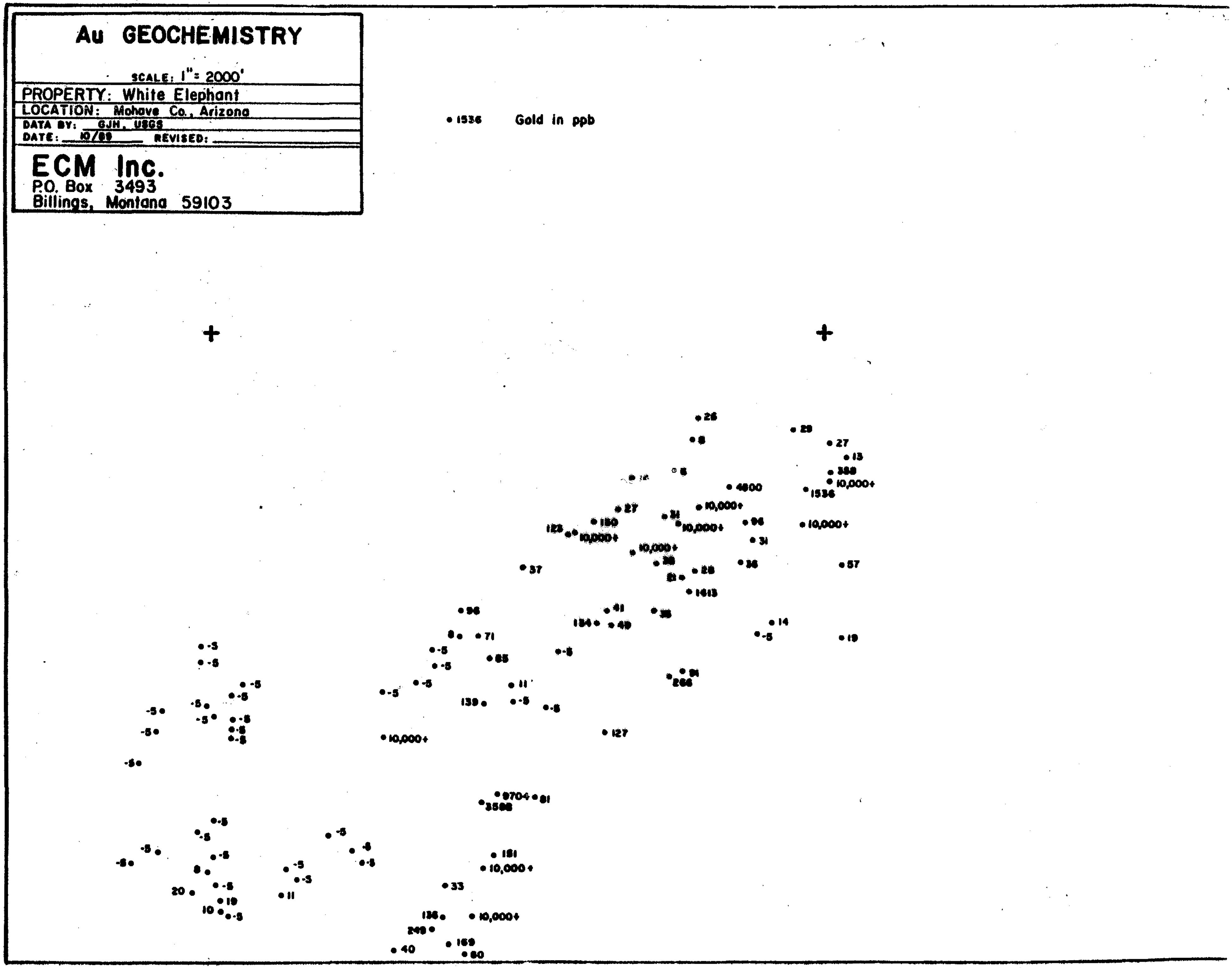
Area of placer deposit and (or) mine

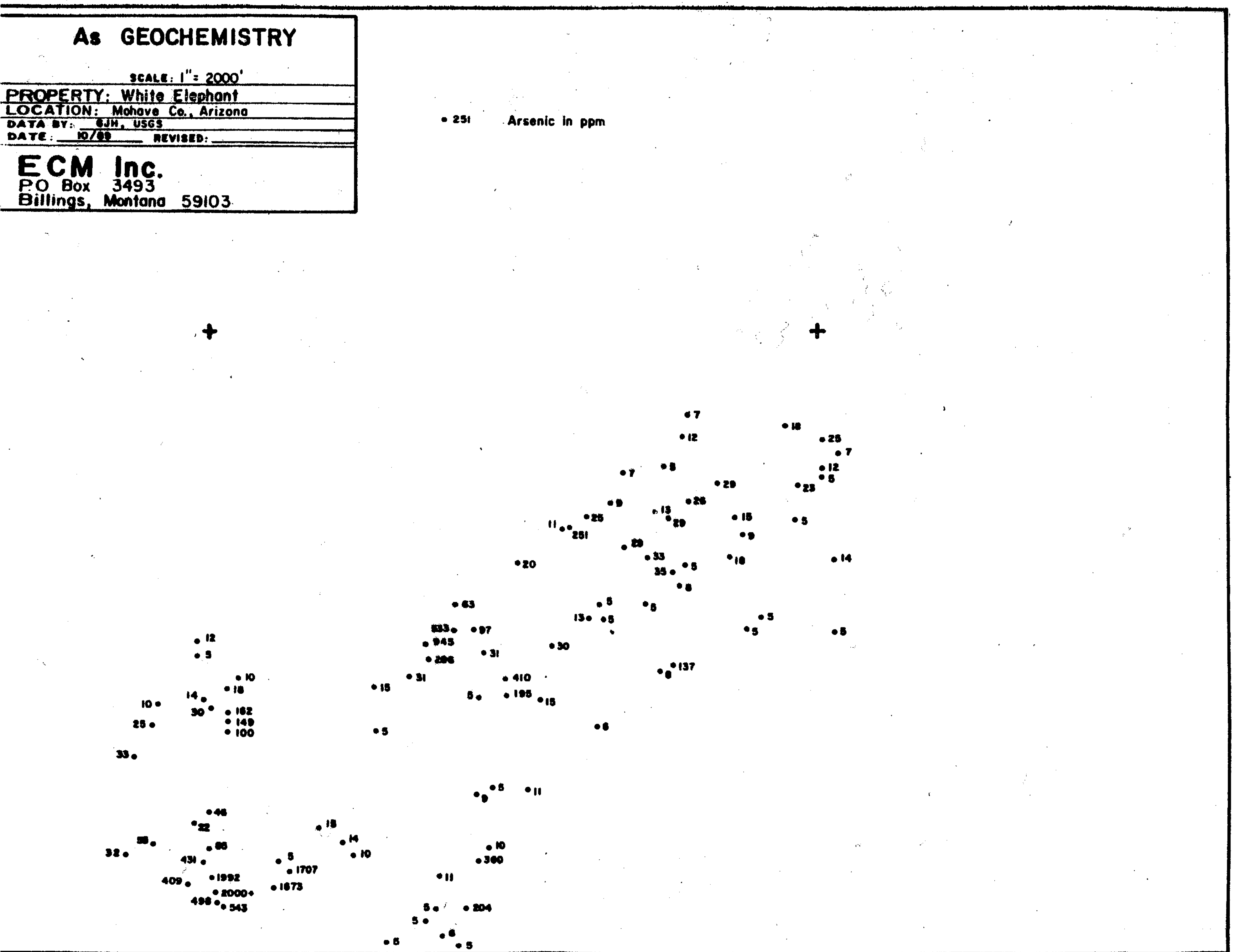
Au GEOCHEMISTRY

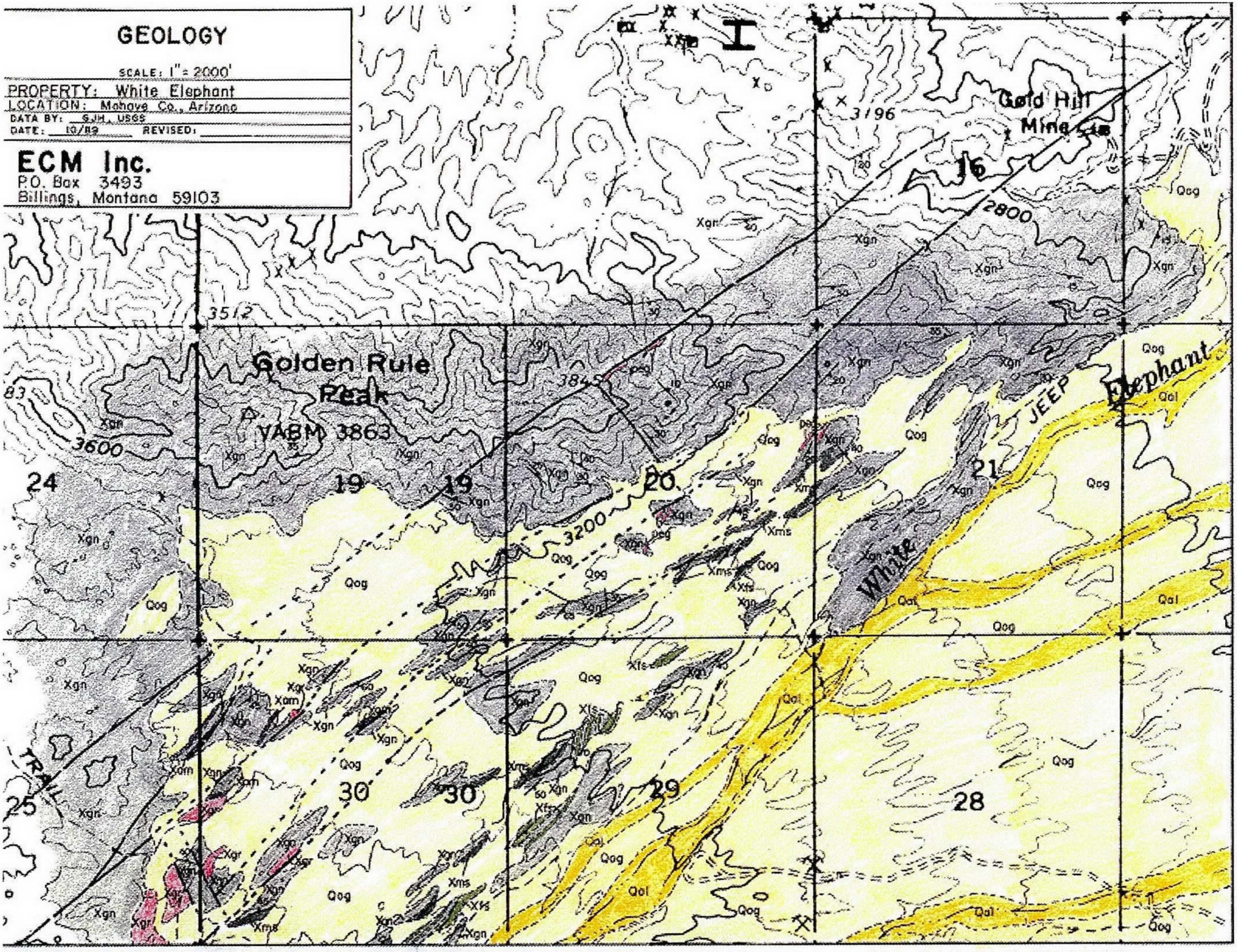
SCALE: 1" = 2000'

PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:

ECM Inc.
P.O. Box 3493
Billings, Montana 59103




As GEOCHEMISTRY
SCALE: 1" = 2000'
PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:
ECM Inc.
P.O Box 3493
Billings, Montana 59103
• 251 Arsenic in ppm


GEOLOGY
SCALE: 1" = 2000'
PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:
ECM Inc.
P.O. Box 3493
Billings, Montana 59103
Gold Hill Mine
Golden Rule Peak
VABM 3863
White Elephant
JEEP
TRAIL
3196
3512
3845
3600
3200
2800
16
19
20
21
24
25
28
29
30
Xgn
Qog
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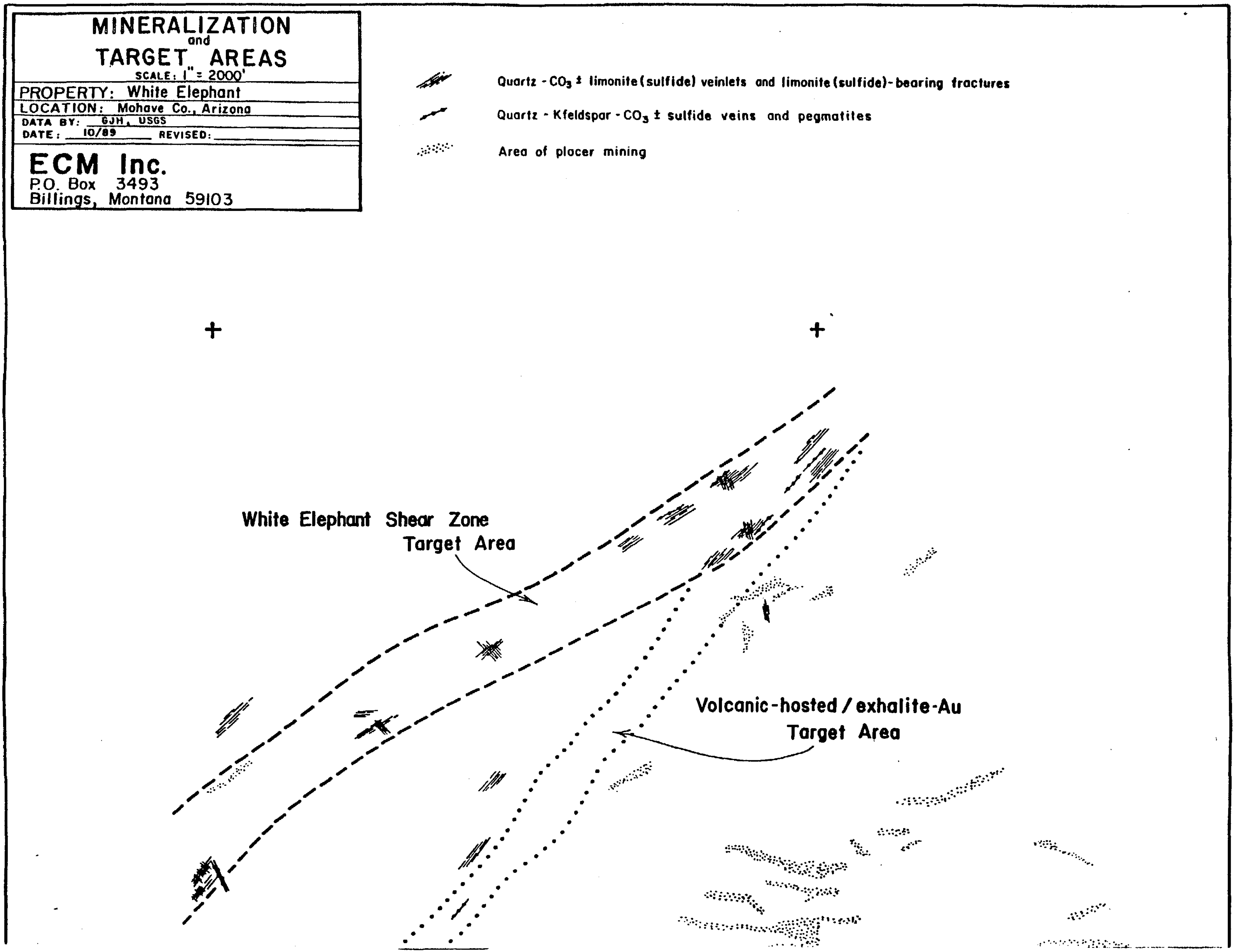
Xfs
Xgr
Xam
peg



MINERALIZATION and TARGET AREAS
SCALE: 1" = 2000'
PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:
ECM Inc.
P.O. Box 3493
Billings, Montana 59103
Quartz - CO_3 ± limonite (sulfide) veinlets and limonite (sulfide)-bearing fractures
Quartz - Kfeldspar - CO_3 ± sulfide veins and pegmatites
Area of placer mining
White Elephant Shear Zone Target Area
Volcanic-hosted / exhalite-Au Target Area

LAND STATUS

SCALE: 1" = 2000'

PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:

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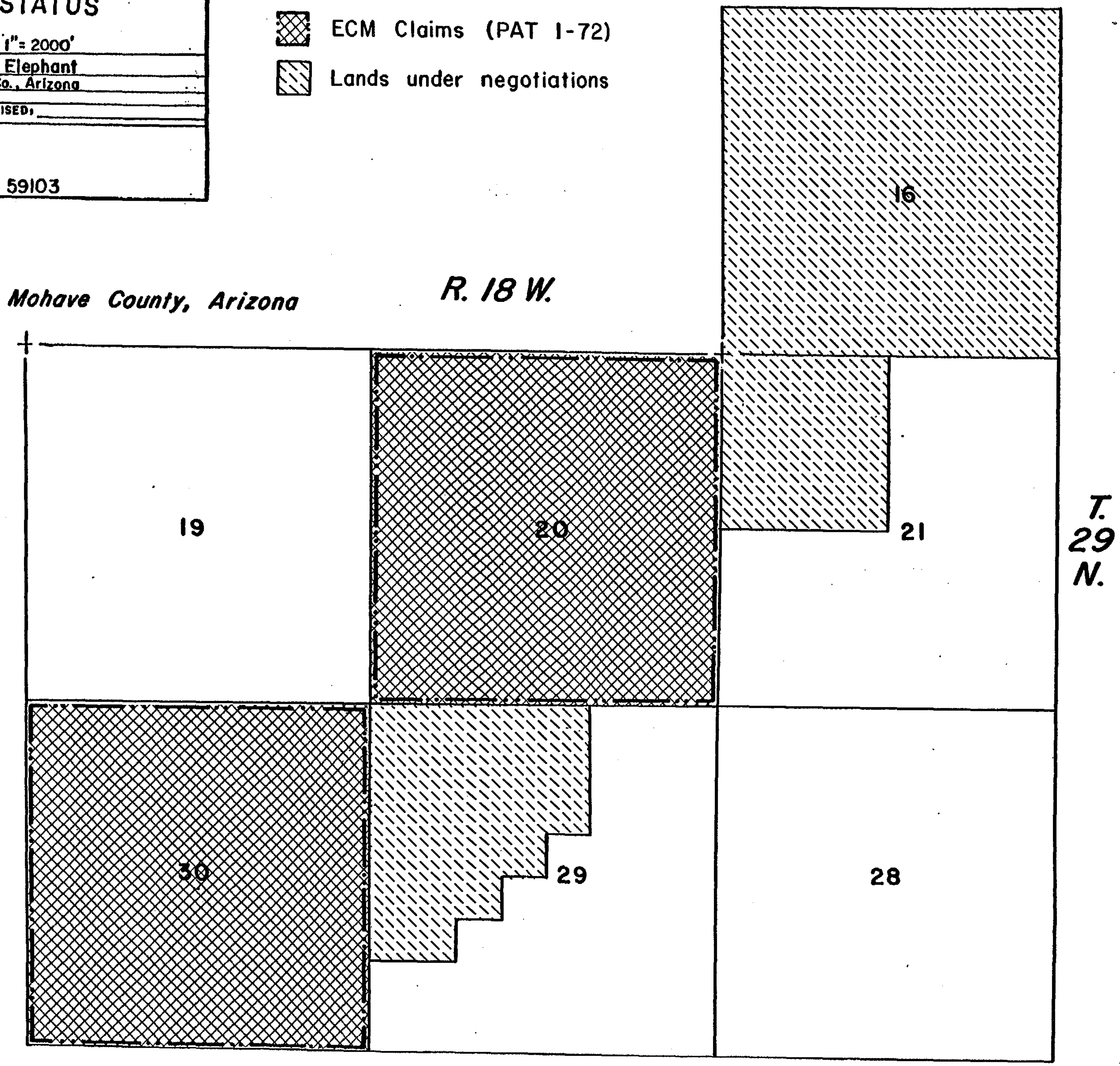

May 1990

Property Name: White Elephant

Location: Sections 20 and 30, T29N, R18W
Mohave County, Arizona

Acreage: Approximately 1440 acres

Land Status: 72 unpatented lode claims located by ECM.

Underlying Royalty: None

Work to Date: Small-scale placer mining occurred on or adjacent to the White Elephant property in the past. Numerous prospect pits and several trenches indicate past efforts to expose gold mineralization associated with the northeast trending White Elephant shear zone. Mapping and sampling by ECM has delineated a gold-enriched, mega-shear system cutting Precambrian metasedimentary and metavolcanic lithologies containing preconcentrated amounts of gold, arsenic, and base metals.

Target: The primary target at White Elephant is a shear zone hosted metamorphogenic gold deposit within Precambrian upper greenschist-amphibolite facies metamorphic rocks. A secondary target is also inferred by the presence of auriferous chemical (?) sediments within metamorphosed volcanogenic stratigraphy. These anomalous rocks support a possible syngenetic, strat-bound gold target.

Positive Data: Pervasive and locally very strong silicification, carbonatization, and K-rick silicate alteration along the White Elephant shear zone depicts multi-stage hydrothermal events that were focused by the structure. Gold, arsenic, and base metal anomalies associated with the shear zone and select volcanogenic units provide areas for target analysis. Widespread placer gold deposits along the trend of the shear zone support a large conceptual target, or numerous disconnected gold occurrences of unknown size and tenor.

MINERALIZATION and TARGET AREAS

SCALE: 1" = 2000'

PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJH, USGS
DATE: 10/89 REVISED:

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P.O. Box 3493
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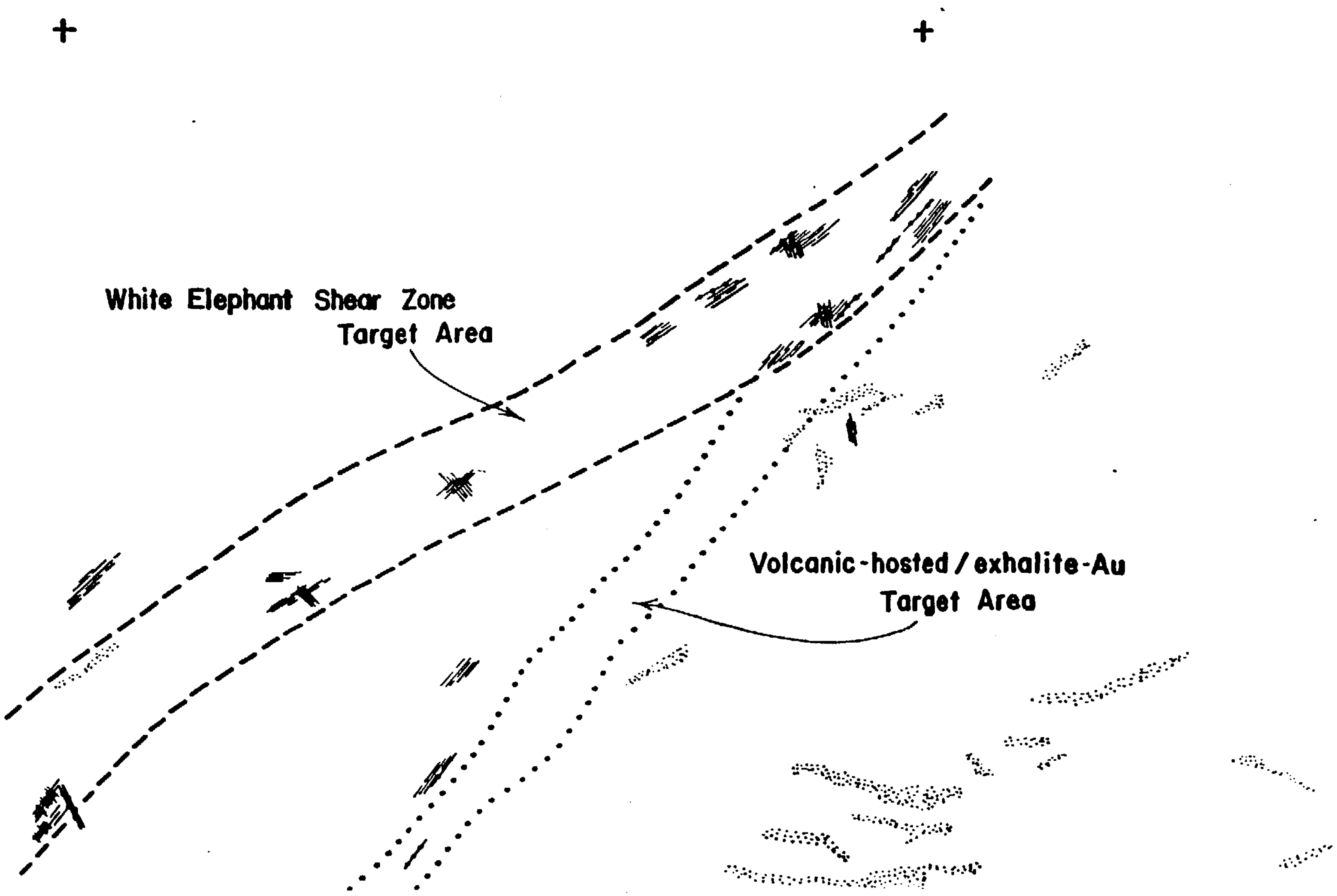
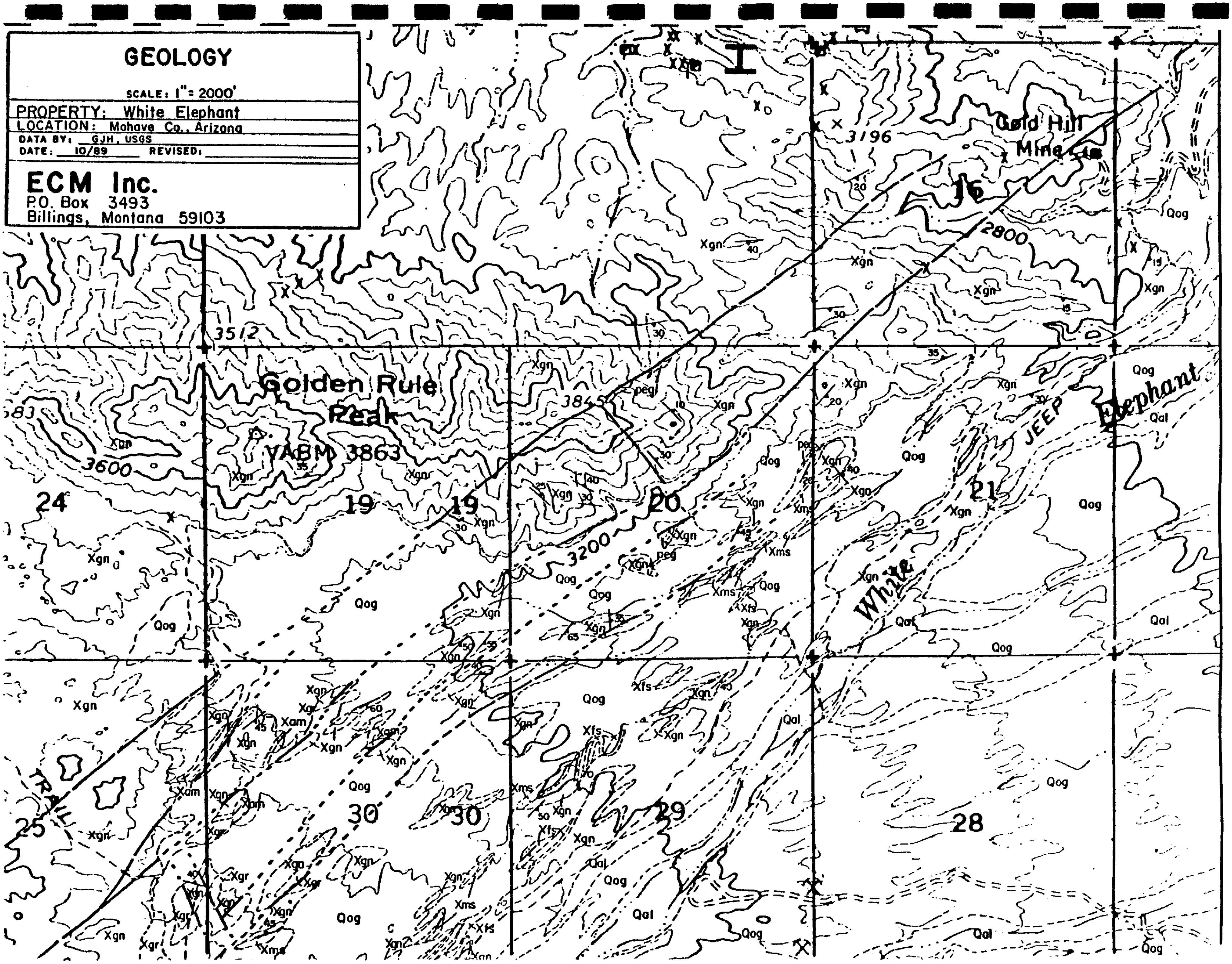
Quartz - CO_3 ± limonite (sulfide) veinlets and limonite (sulfide)-bearing fractures

Quartz - Kfeldspar - CO_3 ± sulfide veins and pegmatites

Area of placer mining




GEOLOGY
SCALE: 1" = 2000'
PROPERTY: White Elephant
LOCATION: Mohave Co., Arizona
DATA BY: GJM, USGS
DATE: 10/89 REVISED:
ECM Inc.
P.O. Box 3493
Billings, Montana 59103
Gold Hill Mine
3196
16
2800
Golden Rule Peak
VABM 3863
3845
3512
3600
3200
24
19
19
20
21
JEEP
White
Elephant
TRAIL
25
30
30
29
28
Xgn
Qog
Qal
Xms
Xfs
Xam
Xgr
peg