CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the JABA, Inc. Tombstone Mining Records

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

Volume ~~3~~ 2 ; Book ~~20~~ 19 0038

TOMBSTONE

Mining District

Cochise County, AZ

Santa Fe Mining, Inc.
Semi-Annual Geologic Reports
To T.D.C. 1988-1992

REPORTS AUG, 1988

SFM SANTA FE MINING INC.

Albuquerque, New Mexico

SEMI-ANNUAL REPORT

TO

TOMBSTONE DEVELOPMENT COMPANY

ON

EXPLORATION ACTIVITIES ON THE SFPM LEASE, TOMBSTONE ARIZONA

FEBRUARY 11 - AUGUST 11, 1988

SEMI-ANNUAL REPORT
TO
TOMBSTONE DEVELOPMENT COMPANY
ON
EXPLORATION ACTIVITIES ON THE SFPM LEASE, TOMBSTONE ARIZONA
FEBRUARY 11 - AUGUST 11, 1988

OVERVIEW

The purpose of the exploration program in the Tombstone area, to date, has been the gathering and integration of a variety of structural and geochemical data aimed at generating specific drill targets in the project area. The area of exploration, shown in Figure 1, was selected to evaluate numerous manifestations of possible carbonate replacement-type ore deposits such as those in the Charleston-Bronco Hill, State of Maine, and Section 32 areas, as well as in the main Tombstone mining district. The data gathering program has progressed through three major phases: a review of the literature and past exploration work, air photo and field structural interpretation, and geochemical sampling. This effort, to the date of this report, has resulted in the generation of two specific exploration targets, one of which is presently being drilled. Additional targets will be determined as the on-going process of data analysis continues. Thus far, approximately six man months of work has been expended on the project, at a cost of about $52,000.00, of which approximately two thirds has been for work on the SFPM

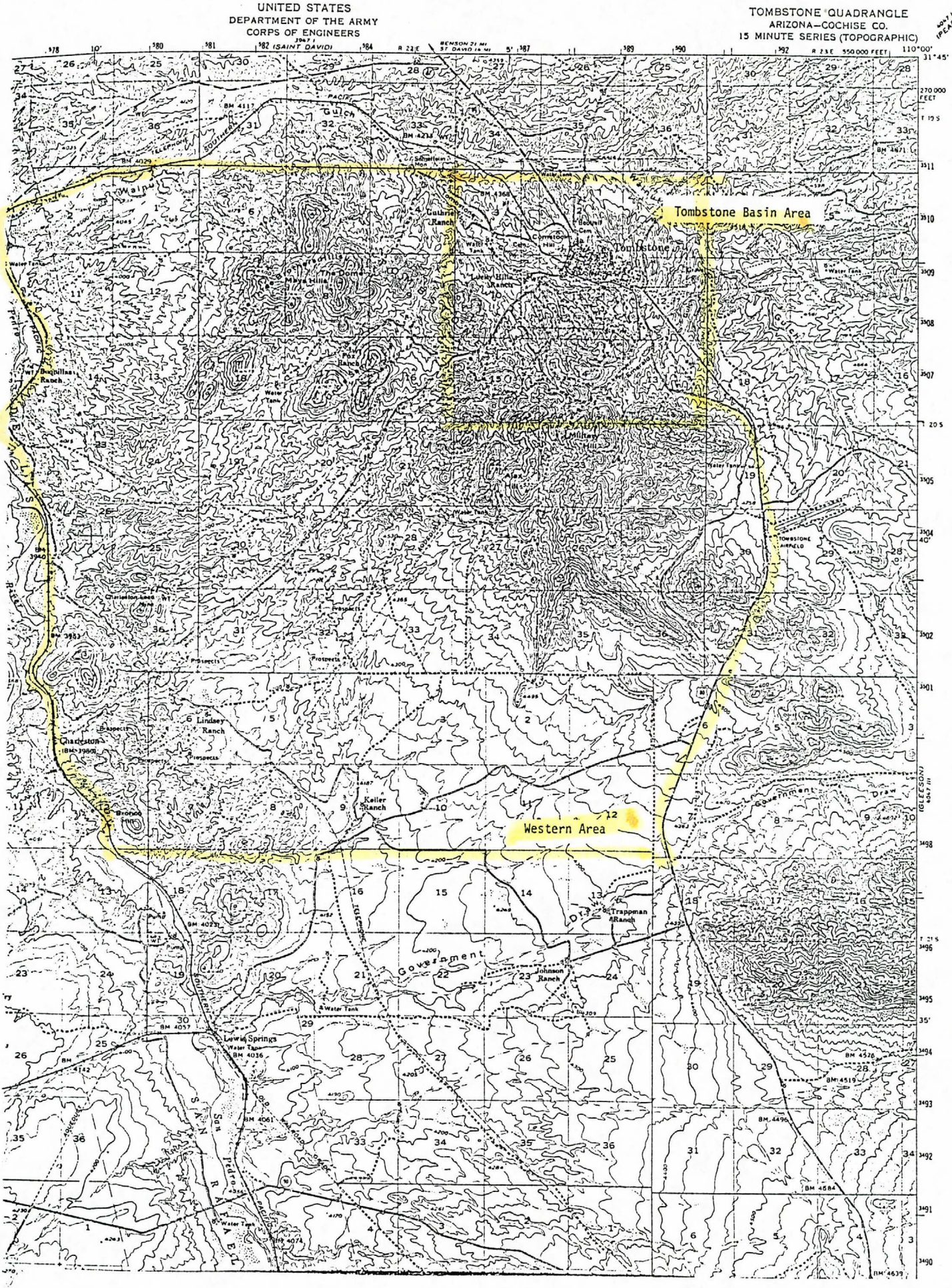


Figure 1. Proposed exploration areas in the Tombstone district and vicinity, Cochise County, Arizona.

lease. The following sections outline the work accomplished in each of the exploration phases mentioned above, as well as discusses the drill targets generated thus far.

LITERATURE SEARCH AND REVIEW OF PAST EXPLORATION

A thorough review of all of the published literature on the Tombstone district, as well as a review of available private archives, yielded valuable documentation of surface and sub-surface geology, ore controls, and certain geochemical zoning patterns. The information thus gathered strongly influenced the formulation and design of subsequent exploration program. Three major sources of information were available: published material, private company archives, and public collections of unpublished maps and reports.

The computerized GEOREF system was used to recover a comprehensive bibliography of the Tombstone literature dating from 1882 to the present. Included in the listing are early reports contained in various mining journals, state and federal articles and bulletins, articles in more recent geologic books, guidebooks, and journals, as well as theses and dissertations. Most valuable among this group is the dissertation by Newell (1975), which contains an excellent geologic map and abundant geochemical data, and the Arizona Bureau of Mines Bulletin 143 (Butler, et. al, 1938) which contains invaluable plans and cross sections of the ore bodies in the main Tombstone district.

Little information was obtained from private company archives, with the exception of the map collection of Tombstone Development Company. Most companies who have mined or have done exploration work in the district either no longer exist, have destroyed or misplaced the pertinent information, or are unwilling to disclose what information they have. A case in point is Newmont Exploration whose personnel were unable to locate drill records or core from their 1952 underground program in the district. Interviews with retired Newmont engineers who performed the work also yield little useful information. The map files of Tombstone Development Company were the only source of private archival information which proved useful to the exploration program.

Two archive collections, available to the public, contained the most valuable underground information obtainable from any source; those of the Arizona Bureau of Geology and the American Heritage Collection at the University of Wyoming. The former has a fragmentary collection of underground maps of various mines in the district, some showing underground geology, and a very few showing assay data. The underground workings and geology of the Lucky Cuss Mine are particularly well documented in this collection. The American Heritage Center's Anaconda collection, available to corporate users for an annual fee of $8,500.00, contains an excellent collection of reports and mine maps covering the northeast part of the

Tombstone mining district. Level maps show detailed underground geology, details of mineralization, and abundant assay data.

The result of the literature search phase of the project was two-fold. First, it allowed the formation of several theoretical models for mineralization in the Tombstone district, and delineated numerous areas for field testing of these ideas. Secondly, the collected information, in part, dictated the design and methods to be used in the subsequent field program; i.e. it suggested the required areal extent of exploration program, as well as the type and density of field information required to identify specific drilling targets.

STRUCTURAL ANALYSIS

Insofar as many important carbonate replacement deposits are known to be controlled, at least in part, by structure, a thorough structural analysis of the Tombstone region was undertaken in order to identify the most promising areas for ground follow-up. Given the time and manpower available, it was decided that such analysis could best be undertaken using aerial photography. Various types of images were considered for use, ranging from LANDSAT and high-level U-2 images to low-level photography. Given the size and type of target under investigation, it was decided to utilize 1:24000 scale natural color aerial photographs.

The 1:24000 photos were obtained from Exploration Photography, Tucson, from an existing file. These photographs served well in delineating the major structural trends in the Tombstone area. Four sets of structural trends were documented: 1) an early, strong N-S trend primarily affecting Paleozoic and Cretaceous sedimentary rocks, 2) a strong E-W trend, again affecting Paleozoic and Cretaceous sediments, and to a lesser extent Cretaceous volcanics, 3) a NE trend strongly developed in Cretaceous sediments and volcanics, and 4) a late, weak NW trend affecting all rock types.

Despite attempts at computer enhancement, sufficient structural detail in areas of primary interest could not be obtained from the 1:24000 set which also suffered from poor color rendition. To rectify these problems, McLain Harbers Co., Inc. of Tucson, was contracted to re-fly the area to obtain a set of 1:12000 scale (from approximately 6000' above average terrain) natural color stereo photographs of the region, as well a three spot 1:24000 photographs from an altitude of 12000' above average terrain. The resulting set showed superb structural detail as well as excellent rock color rendition. Additional structural overlays were made on these photos and added to the previous 1:24000 interpretations. Together, these were computer-transferred to 7.5 minute topographic quadrangle maps. The 1:12000 photos were subsequently used in the field for mapping additional structural details and for plotting sample point locations.

The resulting structural interpretation map was then overlaid on a geologic map showing all mines, prospects, and mineralized trends in the Tombstone region. The resulting composite showed an excellent correspondence between certain structural trends and/or intersections, and areas of known mineralization. In addition, several areas of favorable structural intersection without known mineralization became apparent as the result of this analysis, serving to further focus the subsequent field mapping and sampling program.

GEOCHEMICAL SAMPLING AND FIELD DATA COLLECTION

The bulk of the effort on the Tombstone project has been spent gathering geochemical samples, as well as collecting and compiling certain geologic data at the sample locations. A total of 355 surface and underground rock samples were collected in the project area previously defined by geologic and structural studies. Of these, 103 surface and underground samples were taken on lands leased by SFPM from Tombstone Development Company. Both surface and underground samples were also taken from property controlled by Tombstone Development adjacent to the SFPM lease; the results of this sampling will be included in the next semi-annual report of activities.

The goal of the sampling program was to obtain the geochemical signature of the highest grade mineralization in a given area, in order to generate metal ratio contour maps, raw assay contour maps, and/or metal value and metal ratio

vectors. To this end, samples consisted of either high-graded dump samples or channel samples of vein material in place. Considerable difficulty in obtaining such samples was experienced in the leased part of the main Tombstone mining district because of the extensive reworking of old dumps and general lack of underground access. An important exception to this situation was in the Lucky Cuss Mine area where sampling could be carried out underground on the 100-500 levels along a stretch between the Old Guard incline and the McCann patent.

All samples collected were assayed as follows: Au and Ag by standard fire assay (Copper State Labs, Tucson), 30 trace element suite by ICP analysis, As,Sb,Bi,Ge,Se, and Te by hydride generation ICP analysis, and F assay by NaOH fusion and ICP processing (Acme Analytical Laboratories, Vancouver). Assay results for samples collected on the SFPM lease are listed in Appendix I; sample locations are shown on the enclosed sample location map.

At each sample location, various geologic data were also collected. These include the following: type and dimensions of mineralization; sample mineralogy, paragenesis, and dilution; alteration type, mineralogy, width and intensity; host rock lithology; strike and dip of mineralized structure and cross structures; and estimated extent of mine workings. It is intended that all of this information will be encoded and entered into the computer data base, along with all assay data, for subsequent analysis. To date, however, only the assay data has been entered, as well as the coding for host

rock lithology, alteration type, and alteration intensity. These latter data appear in Appendix I, accompanying the assay results for each sample.

DATA ANALYSIS

The goal of the data analysis phase of the project is the generation of specific drill target locations based on the integration and interpretation of all of the geologic, structural, and geochemical data at hand. Upon completion of data entry (which is still in progress), the following information will be available for each sample site: a three dimensional sample location (UTM coordinate and elevation), all assay data, and coded geologic/structural information, as discussed above. These data will be used to generate maps showing the distribution of raw assay data, contoured maps of various groups of metal ratios, and maps showing the various types of mineralization and alteration in the project area, and their relationships with each other. In addition, all assay data will be factor analyzed and sample scores plotted to show their areal distribution.

The end result of such analyses should be the delineation of structural/geochemical "bulls eye" targets and/or well-defined geochemical vectors pointing to mineralization centers both in the Tombstone main district and elsewhere in the area. Drill sites will then be selectively assigned to the highest quality targets.

DIAMOND DRILLING

Two drill hole sites have been established on the SFPM lease, the locations of which are shown on the enclosed sample location map. Vertical, 3000 foot deep, HQWL core holes are planned for both locations. Site locations were based on raw sample assay data, structural interpretation, and information gathered from the published literature.

Diamond drill hole T-1 was collared on July 22 at the common corner of the West Side, Blue Monday, and Tribute patents in an area of complex structure near the intersection of the West Side fissure and north-trending structures associated with the Tribute dike. The hole is designed to test for the presence of: 1) mantos, developed deep in the Naco section which are rooted in the West Side fissure feeder and/or 2) the development of a chimney along the West Side at a point of north-trending structural intersection(s). Secondary, the hole is intended to provide a good stratigraphic cross section of the middle and upper parts of the Naco group carbonates, and to test for the presence of Schieffelin granodiorite beneath this part of the mining district. A copy of the drill log for T-1 will be forwarded to Tombstone Development Company upon completion of the hole.

Drill hole T-2 is designed to explore the Lucky Cuss structure at a point approximately 2300 feet below the surface. To be collared about 700 feet due east of the Lucky Cuss shaft on the East Side patent, the hole is targeted on the intersection of the Lucky Cuss fault and the receptive

carbonates of the Middle Naco group, a potential site for the development of significant mantos or chimneys. The drill hole location was based on underground structural observations and the results of sampling in the Lucky Cuss Mine, as well as on published information which suggests an increase in gold values with depth in both the Lucky Cuss and Old Guard Mines.

Additional drill holes are planned to test for deep mineralization on the Lucky Cuss structure. At present two holes are tentatively planned: one to be drilled beneath the Mn-Ag chimneys on the McCann and Wedge claims, and another beneath the Mn-Ag-Pb chimney cropping out at the Luck Sure Mine. Additional drill sites elsewhere on the SFPM lease will be spotted as data analysis progresses.

REPORTS FEB., 1989

P 38

SEMI-ANNUAL REPORT TO TOMBSTONE DEVELOPMENT COMPANY ON ACTIVITIES ON THE SANTA FE PACIFIC MINING LEASE IN THE TOMBSTONE DISTRICT, COCHISE COUNTY, ARIZONA

W. D. RIESMEYER
FEBRUARY, 1989

SEMI-ANNUAL REPORT TO TOMBSTONE DEVELOPMENT COMPANY ON ACTIVITIES ON THE SANTA FE PACIFIC MINING LEASE IN THE TOMBSTONE DISTRICT, COCHISE COUNTY, ARIZONA

W. D. RIESMEYER

SUMMARY

A total of five core holes, with an aggregate footage of 14,841 feet, was drilled on the Santa Fe Pacific Mining lease in the Tombstone district between July 21 and December 20, 1988. Several mineralized intercepts were obtained but none were of both ore grade and width. In addition to the Cretaceous Bisbee formation, an extensive Paleozoic stratigraphy was cored during the program. This included the Martin, Escabrosa, Horquilla, Earp, Colina, and Epitaph formations. While all formations contained mineralization, drill results showed the Earp to be most strongly mineralized, followed by the Epitaph and Colina. Carbonates, particularly recrystallized and/or skarned limestone, appear to be the most receptive host for replacement type mineralization which occurs only rarely in the other lithologies cored during the program. Structural observations suggest that formations occurring deep in the section and consisting primarily of carbonates (i.e. the Martin through the Colina) deformed plastically, while those higher in the section, and having a large clastic component (i.e. the Epitaph the Bisbee), deformed in a more brittle fashion. Mineralization occurring in the core may be classified into six types: 1) base metal

replacements, 2) pyrite replacements, 3) skarn-related mineralization, 4) fracture-controlled mineralization, 5) manganese oxide replacements, and 6) base metal oxide deposits. Of these, types 1, 3, 5, and 6 are volumetrically most important and have yielded the best assay results. Types 1, 2, 5 and 6 resemble manto-type replacements. Some are high grade, but are too thin to constitute ore. Type 4 mineralization includes quartz vein deposits which are of high grade but are volumetrically insignificant. Type 3, skarn mineralization, while widespread is generally of very low grade. Very little direct structural information was derived from the drilling program aside from confirming the continuity of the Lucky Cuss fault to depths exceeding 2,500 feet. Two drill holes missed their targets, apparently because of significant changes in the dip, at depth, of major structural features such as the Westside fissure and the Empire dike. Inter-hole stratigraphic correlations suggest the presence of major, pre-Bisbee faulting which may be significant in planning further exploration in the district.

INTRODUCTION

This report outlines and discusses the results of the drilling program conducted by Santa Fe Pacific Mining, Inc. between July and December, 1988, on lands leased from Tombstone Development Company. The drilling program represents a part of a continuing exploration effort in and around the Tombstone mining district which began in early 1988 with an extensive mapping and sampling project, the results of which were outlined in a previous semi-annual report of activities. The recently completed phase of drilling consisted of five deep core holes with an aggregate footage of 14,841, targeted on areas thought to be favorable for the occurrence of economic carbonate replacement deposits. While numerous mineralized intervals were discovered in the course of the program, none were found to be of adequate thickness and/or grade to be economic. The drilling did, however, yield information pertaining to stratigraphy and structure which will be of value in targeting additional core holes on the property.

This report is intended as a supplement to the accompanying detailed drill logs for holes T1-T5 which record the stratigraphic and structural information from each hole, as well as descriptions and assay data for the mineralized intervals encountered. Laboratory assay sheets are appended. The following report expands on the log information. The first section describes, in detail, the stratigraphy revealed

by the drilling program. Included are lithologic descriptions and paleontological information, as well as summaries of the alteration, structure, and mineralization found in each formation. The second section classifies and describes the various types of mineralization found in the drill core. Each type is described in terms of form, mineralogy, related alteration, structure, and preferred host rock. Representative metal values for each type of mineralization are also included. The final section discusses the structure observed in the core and also describes the structural geology implied by hole to hole correlations. The report is accompanied by two plates. Plate 1 is a geologic map of the Tombstone district which shows the results of mapping during the first phase of exploration, as well as the location of the five drill holes. Plate 2 presents simplified graphic logs for each hole. Summary structural and mineralization data are also plotted on the logs, and inferred inter-hole correlations are shown.

PROGRAM OUTLINE

A total of 14,841 feet of core was drilled in the Tombstone district between July 21st and December 20th, 1988. Five holes, designated T1-T5, were completed. DDH T1 was drilled on the East Side (280) patent to a depth of 2,834. The hole was lost short of its projected TD at 3000 feet because of caving ground. T2, drilled on the Blue Monday claim, reached TD at 3,003 feet. T3, on the East Side (376), was TDed at 3,000 feet. T4 was drilled on the Luck Sure and reached a depth of 3,000 feet. T5 was collared on the Silver Thread patent and TDed at 3,004 feet beneath the Empire claim. All holes were vertical except T5 which was drilled N57^{o}W at -80°. NC core was recovered from the upper parts of the holes until reduction became necessary to NX core. Core recovery in all holes averaged 100%.

Drilling was carried out by Longyear Contract Drilling Company utilizing Longyear Hydro-44 rigs. The program began using two 10 hour shifts. Inadequate progress, however, required changing to three 8 hour shifts in early November. Overall average production was approximately 35 feet per shift. Core logging was done on site on a daily basis. W. D. Riesmeyer and K. E. Eagan (North American Exploration, Inc.) where the primary core loggers. P.K.M. Megaw logged the majority of T2 early in the program. The core was stored on site in a watertight sea-going container. Core for assay was shipped to various labs for splitting or sawing, and sample prep.

Assaying, early in the program, was done by Copper State Analytical Laboratory in Tucson, but was later shifted to Mountain States R&D in Vail, Arizona. Gold and silver were determined by standard fire assay; copper, lead, and zinc by regular assay. Thirty trace elements were determined by ICP analysis, and As, Sb, Bi, Ge, Se, and Te by hydride generation and ICP analysis. Fluorine was determined by sample fusion with NaOH, leaching and analysis by specific ion electrode. All minor element determinations were done by Acme Analytical Laboratories, Ltd., Vancouver, British Columbia. Assay results were entered in the computerized Tombstone data base, and major metal assay values were posted on the drill logs.

STRATIGRAPHY

The following formations were cored during the 1988 drilling program: Martin limestone, Escabrosa limestone, Horquilla limestone, Earp formation, Colina limestone, Epitaph dolomite, and the Bisbee formation. In addition, Schieffelin granodiorite was encountered in one hole. In general, the Bisbee and formations of the upper Naco group were recovered in drill holes 1-4, while the Bisbee, Horquilla, Escabrosa, and Martin were cored in hole 5 in an apparently up-faulted block.

Most rocks in the project area are moderately to strongly altered. This, along with the paucity of fossils, made the precise determination of formation tops and bottoms difficult. Formation contacts could, however, be determined with a fair degree of certainty within a few to a few tens of feet. The stratigraphy of each hole, as well as hole to hole correlations, are summarized on Plate 2.

Martin Limestone

Distribution and Thickness. The upper Devonian Martin limestone was encountered only in DDH T5 where it was cored in the lower 339 feet of the hole. Only two questionable bedding angles were determined which suggest between 185 and 300 feet true thickness of the Martin were cored. Gilluly measured a true thickness of 230 feet in the Tombstone Hills, suggesting a nearly complete section may have been drilled in T5.

Lithology. In drill hole T5, the Martin consists of light to medium gray, silty to argillaceous, generally massively bedded limestone, with abundant interbedded siltstone. The siltstones form beds from a few inches up to 30 feet thick consisting of tan, brown, or green, fine to medium grained clastic material. Such beds are far more abundant than in the overlying Escabrosa. The limestone generally lacks any distinguishing characteristics except for the presence of black (organic) stylolites which are common in the lower part of the unit.

Stratigraphic Relationships. The Martin is in apparent conformable contact with the overlying Escabrosa. The upper contact was placed at the contact between "clean" Escabrosa limestone and the distinctly silty limestone of the Martin. The abundance of interbedded siltstone also served to differentiate the two formations. Scattered intervals of very poorly preserved crinoid stems and brachiopods are present in the cored section, but they were of no diagnostic value.

Alteration Summary. Due to the silty and argillaceous nature of the limestone, skarn development is prominent in the Martin. Several long intervals of weak to moderate wollastonite garnet-vesuvianite skarn with a pseudo-conglomerate structure were cored. Where not skarned, the limestone is moderately recrystallized. Siltstone units are moderately hornfelsed and contain significant amounts of epidote. ?

Mineralization Summary. No significant mineralization was found in the Martin. Weak, disseminated and veinlet-controlled pyrite mineralization is associated with skarned intervals, as are trace amounts of sphalerite. Two rhodochrosite "veins" (2" and 6"), with associated trace pyrite and sphalerite, were cut in the lower part of the formation.

Structural Characteristics Summary. In T5, the Martin is "tight"; fracture intensity is low, both in limestone and siltstone units, even where skarned or hornfelsed. Fracture angles are generally >45° to the core axis. The only exception to these characteristics is a 15 foot sheared and brecciated zone in an unaltered siltstone unit high in the formation. Here, nearly vertical fractures and shears are tightly cemented by calcite.

Escabrosa Limestone

Distribution and Thickness. The lower Mississippian Escabrosa limestone was cored only in DDH T5 where a total of 702 feet was recovered. Measured bedding angles suggest a true thickness of 450 feet was cut. This does not match well with Gilluly's measurement of 733 feet in the Tombstone Hills, perhaps indicating a part of the T5 section has been faulted out or attenuated along the limb of a fold.

Lithology. The Escabrosa in T5 is primarily a limestone unit, but, unlike the formation elsewhere in Cochise County, it here contains approximately 12% siltstone interbeds. Where

least altered, the limestone is very light to medium gray, fine grained, and massively bedded; some intervals consisting of crinoid cocina. Several sections contain one to two inch, round to irregularly shaped, dark gray to cream colored chert nodules. Chert is far less common, however, than in the overlying Horquilla. Limestones are weakly stylolitic towards the top of the formation. Siltstone interbeds range from a few inches up to 13 feet thick. They are predominantly brown, but are also black, green, or dark gray, and are fine to medium grained, and thinly bedded to massive. One five foot bed of fine grained, greenish white dolomite was cored near the middle of the formation.

Stratigraphic Relationships. The Escabrosa is in apparent conformable contact with the underlying Martin and the overlying Horquilla limestone. The upper contact is distinguished by a dramatic increase in the degree of recrystallization in Escabrosa limestone, compared with that in the Horquilla, as well as a substantial decrease in the amount of chert downward across the contact. While this division may appear to be quite arbitrary, the contact, as picked, fits very well with published descriptions. The fossil content of the Escabrosa is rather sparse, consisting largely of crinoid stems and unidentifiable brachiopods, gastropods (up to 1" tall), rugosa (up to 3" long), and various pieces of trilobites. One cross section of a pygidium, sufficiently well preserved and distinctive, allowed

positive identification of the lower Mississippian trilobite crytosymbole hercules, confirming the unit to be Escabrosa.

Alteration Summary. The entire Escabrosa section in T5 is altered to one degree or another. The upper half of the unit is strongly recrystallized, yielding a coarse grained white marble. Interbedded siltstones are strongly hornfelsed. In the lower half, limestones are either weakly recrystallized or weakly to moderately skarned. Where best developed (around and in cherty horizons), the skarn has a pseudo-conglomerate structure with mottled pink, apple green, and gray colors, and consists of silica, tan garnet, epidote, chlorite, and wollastonite. Other intervals are silicified in a distinctive anastomosing network fashion. Also, in the lower half of the formation, short two and three foot intervals have been converted to light green talc probably derived from dolomite interbeds. Siltstone units in the lower half are weakly to moderately hornfelsed; some hornfels intervals have been bleached.

Mineralization Summary. Disseminated and veinlet-controlled pyrite occurs sparingly throughout the Escabrosa, most commonly associated with hornfels and the most strongly developed skarn intervals. Similarly, very weak sphalerite, galena, and/or chalcopyrite disseminations or veinlets occur, associated usually with skarn intervals. Nowhere do base metal sulfides exceed 1%. Two 2" rhodochrosite "veins" occur in the cored section which are accompanied by trace sphalerite, galena, and chalcopyrite.

Structural Characteristics Summary. The Escabrosa, in T5, is very "tight"; fracture intensity is very low throughout, except in the lone dolomite bed where it is moderate. Most fracture orientations fall between 30° and 60° to the core axis. Faults, shears, breccias, and other signs of brittle deformation are altogether lacking, while evidence of plastic flow, with nearly vertical orientation, is abundant.

Naco Group
Horquilla Limestone

Distribution and Thickness. As is the case with the above-mentioned units, the lower Pennsylvanian Horquilla limestone was cored only in DDH T5. A total of 1,497 feet was cored. Measured, well-defined bedding shows that T5 cored a true thickness of 1,060 feet which compares very well with the 999 foot thickness measured by Gilluly in the Tombstone Hills.

Lithology. The Horquilla in T5 consists of over 95% limestone. The remainder consists of siltstone/shale beds up to 16 feet thick, and one four foot bed of cherty (intraformational ?) conglomerate. The bulk of the siltstone/shale, as well as the conglomerate, occur in the upper quarter of the formation. The limestone, where unaltered, is very light gray, fine to medium grained, and massive to thickly bedded. Several intervals in the upper quarter have a distinct shaly component, while the lower three quarters of the formation is very "clean" limestone. Large, brown to black, rounded chert nodules occur sparingly in the upper quarter of the Horquilla, are rare in the middle parts, and are quite numerous in the lower quarter. The general abundance of chert in the Horquilla serves well to distinguish it from limestones of the overlying formations of the Naco Group.

Stratigraphic Relationships. The upper contact of the Horquilla in T5 is a profound erosional unconformity being overlain by the Cretaceous Bisbee formation. While the lowermost Bisbee is a conglomerate, there is no evidence, in the core, of an erosional surface at the top of the Horquilla. The definition of the lower Horquilla contact has been discussed previously. In addition to the abundant chert, identification of the Horquilla was materially aided by the presence of abundant fossils. The formation contains numerous large, chert filled burrows and other evidence of extreme bioturbation. Also observed were long sections composed almost exclusively of fossil "trash": crinoid stems, fusilinids, rugosa, brachiopod fragments (both articulated and non-articulated types), and bryozoa. One rugosa was identified with fair certainty as rugosa lophophyllidium a Penn-Perm horn coral. Most important, however, was the discovery of the lower Pennsylvanian index fusilinid triticites sp? exceptionally well preserved in chert in the lower part of the formation.

Alteration Summary. Alteration of the Horquilla in T5 consists primarily of recrystallization and skarning of the limestone and development of hornfels in the rare siltstone units. Recrystallization affects the upper and middle parts of the formation. In these areas, long sections have been converted to a coarse grained gray-white marble. In the lower half, only patchy, weak recrystallization was observed. Skarning shows similar spatial development. Unlike most other

formations in the project area, Horquilla skarn mineralogy is simple, consisting of quartz and wollastonite, with only rare, patchy development of garnet.

Mineralization Summary. Most mineralization observed in the Horquilla occurs in the upper half of the formation associated with skarn or recrystallized limestone. Here, several zones of manganese oxide dendrites with associated pink limestone alteration and disseminated pyrite were observed. Zones of trace to very weak, disseminated and veinlet-controlled pyrite, sphalerite, and galena in skarn are also common in the upper half of the Horquilla, but none returned significant assay values. The best intercept was a ten foot segment of galena>sphalerite>>pyrite associated with a quartz vein in recrystallized limestone, four feet of which ran 8.99 opt Ag and .06 opt Au.

Structural Characteristics Summary. Like the carbonate formations below it, the Horquilla is "tight", with a low fracture density throughout. Fracture angles are low; generally less than 45° from horizontal; high angle fractures are exceedingly rare. What best exemplifies the structural character of the Horquilla is the presence of numerous zones of plastic deformation and flowage, all of which are oriented within 15° of vertical. This strongly suggests that the Horquilla deformed plastically along the limbs of the Silver Thread anticline rather than yielding in a brittle fashion.

Earp Formation

Distribution and Thickness. The upper Pennsylvanian Earp formation was cored in DDHs T1, T2, T3, and T4. All four holes were TDed in Earp sediments. Footages cored were 225, 455, 585, and 1,250 feet respectively. Measured bedding angles indicate true thicknesses of 180, 410, 480, and 715 feet. Gilluly reports a thickness of 595 feet for the Earp in the Tombstone Hills. The great thickness of the formation in T4 is undoubtedly due to repetition of the unit by faulting, of which there is abundant evidence in the core.

Lithology. The Earp is easily distinguished from other members of the Naco group by its large clastic component. This component ranges from 74% of the formation in T2 to 34% in T4, and consists mostly of shale and siltstone, along with one short interval and sandstone and one of arkose. Earp shales are black to greenish black, laminated to thinly bedded, and generally calcareous. Siltstones range in color from tans and browns to grays and blacks. Most are finely bedded, and many intervals are calcareous. The lone sandstone unit, in T3, is light gray, very fine grained, and thinly bedded. There is no apparent pattern of upward fining or coarsening of the clastic units within the Earp. Earp limestone units are light shades of gray where unaltered, and white where recrystallized. Unaltered limestones are fine to medium grained and generally massive, although rare bedding planes are occasionally observed. Much of the limestone in the Earp section is argillaceous or has a silty component,

judging by the abundant development of skarn minerals. Stylolites are common in several limestone intervals. A few dolomite beds, up to 10 feet thick, are interbedded with limestone in two holes.

Stratigraphic Relationships. The top of the Earp is placed at the top of the first significant clastic unit occurring beneath the Colina. While an occasional similar clastic bed occurs within the Colina, the character of any underlying Colina limestone is so distinctive that picking the first Earp clastic unit can be done with confidence. In core, the Colina-Earp contact is entirely conformable; there was probably no time break between the deposition of the two formations. The bottom contact, that between the Earp and Horquilla, was not penetrated in any drill hole. The Earp is only sparingly fossiliferous and those fossils that exist are very poorly preserved. Crinoid stem and rugosa fragments were found, along with unidentifiable fusilinids; none were of any use in determining the age of the formation.

Alteration Summary. Irregular development of recrystallization, skarn, and hornfels characterize the alteration of the Earp. Alteration patterns are complex within a single hole and are not consistent between holes, undoubtedly due to the complex vertical and lateral changes between carbonate and clastic lithologies. The Earp in T1 shows moderate to strong recrystallization and hornfels development, but no significant skarn, while T4 shows very strong recrystallization and hornfelsing and patchy skarning. T2 and T3 show similar

alteration, but also contain intervals of skarn which appear to increase in thickness and intensity down hole. Skarn in the lower Earp of T2 and T3 is the most strongly developed and the most mineralogically complex of any found to date in the district. Developed both in limestones and in calcareous clastics, skarning is so intense that little or no remnant carbonate remains in the core. In these areas, the rock has been totally converted to quartz, green and/or tan garnet, vesuvianite, and wollastonite. In some skarn zones a brown pyroxene is also present. In addition to these prograde minerals, retrograde (?) actinolite, chlorite, talc, and epidote are present in some skarn zones.

Mineralization Summary. The Earp is perhaps the most heavily mineralized formation drilled, although nowhere were ore grade intercepts obtained. Pyrite mineralization occurs with all lithologies and alteration types, but shows a strong preference for calcareous and/or hornfelsed siltstone. Disseminated to semi-massive manto-type galena-sphalerite± chalcopyrite mineralization occurs mainly in skarned limestone; one 1 foot interval of such mineralization assayed 13.42 opt Ag, 5.10 Pb, and 3.66 Zn. Similar mineralization also occurs in skarned dolomite, and, to a leaser degree in recrystallized limestone. Perhaps the most intriguing mineralized interval occurs in probable cave fill below a 13 foot void in T4. Here, at a depth of 2845, feet wulfenite, mimetite, hemimorphite, and possible bromargyrite are found

disseminated through the vuggy fill. Manganese oxides appear to form a halo above and below the mineralization.

Structural Characteristics Summary. Overall, the fracture intensity in the Earp is low. However, unlike lower formations, there exist several zones of moderate to high fracture density, especially in the clastic units and in the occasional dolomite horizon. Fracture orientation spans the range from nearly flat to vertical. Further, the Earp is broken by numerous faults which have left relatively open gouge and breccia zones. No evidence of plastic deformation was observed. In general, the Earp appears to have yielded in a more brittle fashion than underlying units.

Colina Limestone

Distribution and Thickness. The Permian Colina limestone was cored in DDH's T1, T2, T3, and T4. In these holes, a total of 675, 655, 680, and 510 feet of the formation, respectively, was recovered. Recalculation, using very questionable bedding angles, shows 520, 505, 490, and 335 feet true thickness were cored. Gilluly reports a thickness of 635 feet in the Tombstone Hills.

Lithology. The Colina is the most distinctive formation cored during the drilling program. With few exceptions, it is a white to very light gray, coarse grained calcite marble which, in places, is stylolitic. Only in a few short intervals does recrystallization decrease enough to hint of the Colina's original character - a dense, aphanitic, black

limestone. In DDH T2 and T4, the Colina consists exclusively of limestone marble. In T1 and T3, a few beds of thinly bedded dark gray siltstones and shales, generally less than 10 feet thick, occur towards the bottom of the formation, reflecting a change towards the more clastic sedimentation of the underlying Earp.

Stratigraphic Relationships. The top of the Colina is placed at the base of the last clastic or dolomite unit of the overlying Epitaph formation. Because of the distinctive marblized nature of the Colina and the lack of clastic units in its upper part, the top contact is easily spotted. The character of the lower contact with the Earp has been previously discussed. Because of the strong recrystallization, most fossils in the Colina have been destroyed. None of the Colina-characteristic gastropods omphalotrochus were observed in the core; the only fossils found were poorly preserved and unidentifiable fusilinids.

Alteration Summary. Strong recrystallization is the most characteristic alteration type in the Colina and has affected all of the limestone to one degree or another. Siltstone/shale horizons are strongly hornfelsed. Towards the bottom of the unit, numerous zones of generally weak quartz-wollastonite-garnet-vesuvianite±pyroxene±actinolite±epidote± chlorite skarn have been developed in what must originally have been zones of argillaceous limestone. Short intervals (<5') of Colina marble have been sanded, yielding a mass of

extremely friable calcite crystals. Significant sanding has not been observed in any unit other than the Colina.

Mineralization Summary. The Colina is the third most well mineralized unit next to the Earp and Epitaph. Numerous thin mantos or thin, bedding-parallel veins of massive galena-sphalerite-chalcopyrite±pyrite are scattered throughout the formation. They range from paper thin up to a few inches thick. One such "mini-manto", 1.5 inches thick, assayed 1.87 opt Ag, 2.14% Cu, 10.4% Pb, and 5.4% Zn. Finely disseminated galena-sphalerite-pyrite occurs associated with skarned intervals in the lower part of the formation, and along organic-rich stylolites. In either occurrence sulfides do not exceed 1%. Significant manganese oxide replacements occur in the Colina in T1 and T4. In T1, a seven foot section is largely replaced by manganese oxides and only assays .35 ppm Ag. In T4 there are numerous, thin manganese oxide mantos. Two such zones, two and six feet thick, contain, in addition to manganese minerals, wulfenite, mimetite, and fluorite; assemblages similar to those found in stopes of the Empire Mine. One 1 foot section assayed 2.84 opt Ag.

Structural Characteristics Summary. Fracture density in the Colina is generally low and fracture orientation is usually >45°. The intensity of fracturing tends to increase in skarned intervals and in siltstone interbeds. There are few faults in the Colina; those which exist have left tight, thoroughly healed breccias or shears. Any convincing evidence

of pre- or syn-metamorphic plastic or brittle deformation of the Colina has been obliterated by the intense recrystallization.

Epitaph Dolomite

Distribution and Thickness. The Permian Epitaph dolomite occurs in drill holes T1-T4. The cored footages are as follows: T1: 1,010', T2: 540', T3: 1,040', and T4: 590'. Adjusted for bedding angles, true thicknesses are 780', 440', 735', and 200' respectively. Gilluly reports a thickness of 780 feet in the Tombstone Hills. The abnormal thinness of the formation in T4 is undoubtedly due to intense faulting along the Lucky Cuss structure. The thin section in T2 may be more apparent than real in that the upper contact with the problematical Scherrer formation may be misplaced, or part of the Epitaph may simply have been faulted out (see Plate 2).

Lithology. Epitaph lithologies are extremely varied. Included are limestone, dolomite, shale, siltstone, arkose, sandstone and conglomerate. The reader is referred to Plate 2 for a generalized view of the distribution of the various lithologies in the drill holes. It would appear that facies changes in the Epitaph were quite rapid. Thick sequences of dolomite, for example, are present in T1 and T2, especially in the upper and lower quarters. Dolomite is lacking, however in T3 and T4, suggesting either a rapid facies change or localized dolomitization. Clastic units are abundant in T1, T3, and T4, but are almost absent in T2, while carbonates are

abundant in all holes except T4 which is composed to a large degree of siltstone and arkose.

Stratigraphic Relationships. The upper contact of the Epitaph rests against basal conglomerate of either the Bisbee or Scherrer formations and is clearly an erosional unconformity. The Bisbee basal conglomerate is composed primarily of limestone fragments mixed with rarer sandstone and siltstone pebbles, in an arkosic matrix. The Scherrer basal conglomerate consists of epidotized dolomite clasts. The nature of the lower contact of the Epitaph has been discussed above. Only a very few fossils were found in the formation: forams, fusilinids, brachiopods, and echinoderm spines; none were of diagnostic value.

Alteration Summary. In general, the Epitaph shows a noticeably lower degree of pervasive alteration than other formations in the project area. While certain units in the Epitaph show very strong skarn or hornfels development, the overall aspect of alteration in the formation is weak. The exceptions to this observation are a strong skarn section in T3, and moderate to strong argillization found in T2 and T4. The skarn section in T3 is unique among those in other drill holes because of its thickness - slightly more than 200 feet, and its distinctive structure - that of a pseudo-conglomerate. Skarning apparently progressed along bedding and fractures to yield a rock with rounded "clasts" set in a matrix of skarn, all of which resembles a sedimentary conglomerate. Skarn minerals are quartz, wollastonite, tan garnet, and

vesuvianite, along with rare brown pyroxene. In DDH T-2, Epitaph limestone has been largely converted to a white to tan gritty clay for several feet above and below a mineralized interval. Save for a short section of equally intense, but non-mineral-related argillization in T4, this type of alteration is also unique among all the drill holes.

Mineralization Summary. The Epitaph is the second most intensely mineralized formation after the Earp. Unlike the Earp, mineralization in the Epitaph tends to occur in discrete thin mantos and is not scattered throughout the formation as veinlets and disseminations. In T1, a semi-massive manto, two feet thick, composed of galena and sphalerite, assayed 5.81 opt Ag, .09% Cu, 8.3% Pb, and 7.5% Zn over the best one foot. A similar two foot thick manto in T2, which contained, in addition, significant chalcopyrite, assayed 1.32 opt Ag, 1.04% Cu, 5% Pb, and 3.95 Zn over one foot. Several semi-massive pyrite mantos, one to two feet thick, also occur in T1, but all failed to return significant assays. T3 and T4 lacked noteworthy mineralization. It is significant that all important mineralization observed in the Epitaph occurs in limestone units and noticeably avoids adjacent dolomite beds.

Structural Characteristics Summary. The Epitaph has yielded in a far more brittle manner than any of the underlying formations. Fracture intensity, while highly variable, is strong over many intervals, and shows a variety of orientations. Near vertical orientations are more common in the Epitaph than in underlying units. Numerous faults and

shears are present in the formation, many of which have left partially open breccias and semi-porous gouge zones. Only in the thickest carbonate units is fracture intensity low, but even here, there is no strong evidence of plastic deformation.

Scherrer Formation (?)

Distribution and Thickness. The Permian Scherrer formation (?) was observed in only one drill hole: T2. Its presence and identification are somewhat problematic in that the Scherrer has never been reported in the Tombstone district; its closest documented occurrence is at the northern end of the Dragoon Range. A total of 895 feet of probable Scherrer was cored in T2 with an estimated true thickness of 770 feet. Gilluly reports a thickness of 687 feet in the Gunnison Hills.

Lithology. The Scherrer is primarily a clastic formation with limestones, dolomitic limestones, and dolomites occurring in the middle and upper parts. The lower half of the formation consists of a generally coarsening upward sequence of lower shales and upper siltstones. The upper half of the formation consists of sandstones with thick interbeds of limestone or dolomite. In the sandstone units, several thick graded sequences were observed consisting of basal pebble conglomerate ranging upward to silty, fine grained sandstones.

Stratigraphic Relationships. The top of the Scherrer in T2 is well-defined at the base of the basal (Glance) limestone conglomerate of the Bisbee formation. The contact is clearly

erosional, but there is no apparent angular unconformity between the two formations. The lower contact of the Scherrer is set at the base of a dolomite pebble conglomerate which overlies shales of the Epitaph formation. The placing of this contact is somewhat arbitrary and is perhaps too low, accounting for the anomalously thin section of underlying Epitaph referred to previously. No fossils were found in the Scherrer to assist in resolving this problem.

Alteration Summary. Alteration throughout the Scherrer is generally weak with the exception of moderate recrystallization of some of the carbonate units. Clastic units, especially those deepest in the section, show weak development of hornfels. Weak wollastonite-actinolite skarn is patchily developed in some carbonate units and in sections of calcareous sandstone. With the exception of the Bisbee, the Scherrer is the least altered formation observed during the present drilling program.

Mineralization Summary. Weak disseminated and veinlet-controlled pyrite mineralization is found throughout the Scherrer. Weak manganese oxide replacements of carbonate units are scattered through the upper half of the formation. No significant base or precious metal mineralization, however, occurs anywhere within the Scherrer.

Structural Characteristics Summary. Brittle deformation characterizes the Scherrer. Fracture density, while variable, is high over long sections. Fracture orientation is also highly variable with numerous high and low angle sets

observed. Numerous breccias, both semi-open and healed are present, most notably in the brittle sandstone units. Carbonate units, while showing low to moderate fracture density, host numerous breccias and shears, and show no evidence of flowage or plastic deformation.

Bisbee Formation

Distribution and Thickness. The Cretaceous Bisbee formation overlies Paleozoic rocks in all drill holes in the project area. Cored thicknesses are as follows: T1: 650', T2: 445', T3: 685', T4: 650', and T5: 395'. Calculated true thicknesses are 330', 295', 310', 120', and 250' respectively. In the Tombstone area, Gilluly reports a thickness is excess of 3000 feet. Accordingly, all drill holes penetrated the very basal parts of the Bisbee.

Lithology. In the project area, the Bisbee formation consists of a basal conglomerate (Glance) of variable thickness overlain by finer grained clastic rocks with interbedded limestones. The basal conglomerate ranges from 8 to 28 feet thick. In T2, T3, and T4, limestone pebbles and cobbles are the dominant clast lithology, while sandstone and siltstone fragments are the primary clast types in T1 and T5. Overlying the conglomerate are thick, monotonous intervals of siltstone or arkose with lesser amounts of sandstone and conglomerate. Graded bedding is common in some units. Limestone units are scattered throughout the section, but are more numerous towards the bottom. They range in thickness from a few inches up to 75 feet. Hole to hole correlation of

the limestone units proved impossible (see Plate 2), suggesting the carbonate units are very lenticular and that the historically applied names (eg. the "Blue", "Joe", etc.) are of use only on a very local basis.

Stratigraphic Relationships. As discussed above, the base of the Bisbee is set at the base of the lowest (basal) conglomerate. The top of the formation was not seen in core. A few scattered fossils - gryphea and large gastropods- were found in the Bisbee, but none had any diagnostic value.

Alteration Summary. With the exception of that cored in DDH T3, the Bisbee is only weakly altered. Carbonate units show weak, patchy development of skarn, while the clastic units are weakly hornfelsed. Very weak silicification affects nearly all Bisbee lithologies.

In T5, short intervals of arkose and siltstone are sufficiently silicified to resemble "novaculite." Bisbee lithologies in T3 are slightly more altered than those in other holes, but overall the formation has the appearance of being only lightly "cooked", in contrast to the distinctly strong alteration found in the Paleozoic section.

Mineralization Summary. Aside from intervals of up to 10% disseminated pyrite in arkose, siltstone, and limestone, and the weak development of manganese oxide replacements in a few carbonate intervals, no significant mineralization was observed in the Bisbee. In the case of the limestone units, this is slightly surprising as these were the hosts for most of the known ore in the district. The only hint of the

possible proximity of ore in the Bisbee was found in T5. Here, euhedral blue green and green fluorite crystals line vugs in a brecciated, silicified limestone. The fluorite's character and nature of occurrence are identical to that which occurs adjacent to the large oxidized orebodies of the Benton-Albert stopes in the Empire Mine.

Structural Characteristics Summary. Most of the clastic units in the Bisbee show strong, brittle deformation in many sections. Numerous fault breccias, shears, and punky gouge zones are common in the clastic units, as are long sections of high fracture density, many of which are dominated by nearly vertical breaks. Carbonate units, contrastingly, generally have low fracture density and many have the appearance of having been smeared along very closely spaced shear planes. While no evidence of true plastic deformation was observed in the carbonates, the "smearing" phenomenon closely approximates it.

Igneous Rocks

Scheffelin Granodiorite

Distribution and Thickness. Two sills (?) of Scheffelin granodiorite occur in DDH T1 which also bottomed in granodiorite. The upper sill occurs in Epitaph limestones, and is seven feet thick. The lower sill cuts Earp shales and is three feet thick. The drill hole cut 11 feet of Scheffelin in the bottom before caving prevented further progress.

Lithology. The Scheffelin is a reddish gray, medium grained, equigranular rock composed of plagioclase, minor K feldspar, minor quartz, and accessary biotite and hornblende. Minor oxidized pyrite was observed in the Earp sills.

Alteration Summary. The granodiorite is moderately altered. Feldspars have been thoroughly kaolinized, while the mafic minerals have been, in part, chloritized. The rock is stained with iron oxides, either from oxidized pyrite or from the alteration of mafic accessory minerals. The limestones and shales immediately adjacent to the sills are not visibly altered - no contact metamorphic effects could be found despite a careful search. This is in accord with findings at similar exposures underground in the Lucky Cuss Mine, and suggests that the Scheffelin was intruded in a very dry condition at fairly low temperatures.

Mineralization Summary. The Scheffelin contains trace amounts of accessory pyrite and is cut by tiny pyrite-bearing veinlets. Given the unaltered and unmineralized nature of the immediately adjacent wall rock and the generally unmineralized nature of the Scheffelin, it is doubtful that the intrusive was responsible for the CRD mineralization in the Tombstone district.

MINERALIZATION

All holes in the 1988 drilling program contained mineralization of one type or another, as did all of the formations cored in the holes. Mineralization varied greatly, however, as to type, mineralogy, and intensity, ranging from skarns containing disseminated pyrite, to thin, but intensely mineralized base and precious metal "mini-mantos", to massive, argentiferous manganese oxide replacements. This section classifies and describes the various types of occurrences found in holes T1-T5.

Base Metal Replacements

This classification embraces bedding-controlled base metal replacements of unskarned limestones. Numerous occurrences are found in the core, but the best examples are found in T1 and T2 in the Epitaph and Colina, respectively.

Mineralogy. The megascopic mineralogy of this type of mineralization is rather simple, consisting of galena, sphalerite, chalcopyrite, and pyrite, along with possible tetrahedrite and argentite. Sphalerite is typically of the honey-yellow amberjack variety; blackjack is rare. Galena, sphalerite, and chalcopyrite usually occur as coarse interlocking grains, up to .5", while pyrite is more fine grained and disseminated among the other sulfides. Tetrahedrite (?) and argentite (?) are very fine grained and occur in tiny veinlets cutting other sulfides. Typically the

paragenesis is amberjack sphalerite - blackjack (if present) - galena - chalcopyrite - tetrahedrite (?), with pyrite occurring throughout the sequence.

Form. This type of mineralization has extremely sharp footwall and hanging wall contacts which are coincident, or nearly so, with the bedding of the host limestone. In gross aspect the contacts are planar, but in detail are slightly irregular. Ranging from 0.1" to 2' in thickness, they resemble miniature mantos in most aspects.

Host Rocks. Base metal "mini-mantos" occur exclusively in "clean" recrystallized, but unskarned, limestone; most commonly that of the Epitaph or Colina. These replacements clearly avoid dolomite units, some having grown from a limestone bed up to the contact of a dolomite unit and stopping abruptly. Such replacements have not been observed in "dirty" limestones, or in any of the clastic units.

Associated Alteration. Most "mini-mantos" are unaccompanied by any discernible alteration, having razor sharp contacts against unaltered limestone. In a very few cases, manganese oxides, in the form of dendrites and/or pinkish limestone, form what may be a halo in both the hanging and footwall of the small mantos. This possible "halo mineralization" occurs several feet (up to eight feet in one case) above and below the manto and is separated from the manto by totally barren limestone.

Metal Values. Manto-type replacement mineralization found in the drill holes is usually of ore grade, but never approaches ore widths. Typical assays are as follows: 1 foot grading .02 opt Au, 5.81 opt Ag, .09% Cu, 8.3% Pb, and 7.5% Zn; 1 foot of a 2 foot thick interval grading 1.3 opt Ag, 1.04% Cu, 5.0% Pb, and 3.94% Zn; and a 1.5 inch thick interval grading 1.87 opt Ag, 2.14% Cu, 10.4% Pb, and 5.4% Zn. Most intervals of mineralization in this classification were too thin (.1"-.5") to have yielded a meaningful assay because of excessive dilution.

Pyrite Replacements

Pyrite replacements occur ubiquitously throughout the core from all of the drill holes, and show great variation in form and intensity. Included in this classification are weak disseminations in megascopically unaltered limestones, to more intense disseminations in skarn, to semi-massive manto-type mineralization in limestone.

Mineralogy. In some of its occurrences, especially in skarns and manto-type mineralization, pyrite replacements are accompanied by base metal sulfides, but in the majority of cases pyrite occurs alone as attested by assay values discussed below.

Form. Pyrite replacements take a variety of forms. Most common are weak, fine grained disseminations of anhedral pyrite. These occur over intervals of less than an inch up to scores of feet in a wide variety of lithologies and with

several associated alteration types. Veinlet- and fracture-controlled pyrite often accompanies the disseminations, and some disseminations are clearly rooted in more intensely mineralized fractures. Weak, fine grained pyrite replacements also occur associated with wavy stylolites, especially in moderately to strongly recrystallized limestones. At the other end of the replacement intensity scale are the manto-type semi-massive pyrite replacements. These take a form very similar to base metal "mini-mantos" discussed above. They are bedding parallel with sharp foot and hanging wall contacts, and range between a tenth of an inch up to two feet thick. They are composed of up to 60-70% anhedral pyrite in a quartz-calcite gangue.

Host Rocks. Pyrite is found in all lithologies cored. It is perhaps most common in fine grained clastic rocks; siltstones and shales, as fine grained disseminations, typically in the 1-2% range, but, in places, forming up to 10% of the rock. In these host rocks some, and perhaps most of the pyrite may be diagenetic. Similar pyrite mineralization also occurs in arkose, sandstone, and conglomerate where it is more clearly of replacement origin. Weak to moderate (up to 10%) pyrite disseminations also occur in limestones and dolomites. In many cases it shows a preference for thin carbonate units sandwiched between fine grained clastic beds, or for the upper parts of carbonate beds immediately beneath shale or siltstone horizons. Semi-massive manto-type pyrite

mineralization occurs exclusively in carbonates. Unlike the base metal manto-types, it occurs both in limestone and dolomite.

Associated Alteration. Pyrite replacement mineralization occurs most commonly in altered rock, but is also occurs in rocks that are not visibly altered - most commonly in limestone. Hornfelsed clastic sediments and skarned carbonates, almost without exception, contain varying amounts of pyrite. In these cases, it is usually in the form of weak, fine grained disseminations, although manto-style semi-massive pyrite occurs in weakly skarned Earp and Horquilla limestones and dolomite. In other cases, pyrite usually accompanies moderate to strong silicification, and zones of weak to strong argillization.

Metal Values. Only in rare instances was pyrite replacement mineralization developed intensely enough to warrant assay. Even where strongly developed, metal values in this type of mineralization are low. The best one foot interval of disseminated pyrite mineralization in shale (T2) ran ND Au, 1.03 ppm Ag, .01% Cu, .16% Pb, and .18% Zn, while the best one foot interval of manto-style pyrite mineralization in Earp limestone (T1) ran .41 ppm Au, 43.75 ppm Ag, ND Cu, .03% Pb, and .01% Zn.

Skarn-Related Mineralization

Skarn-related mineralization is found in all of the Tombstone drill holes and in every carbonate-bearing formation cored during the program. In all instances the mineralization

was either too weak or too thin to even approach economic grades.

Mineralogy. As with other types of Tombstone mineralization, that related to skarns is, megascopically, quite simple. In decreasing order of abundance, the sulfide minerals are pyrite, blackjack sphalerite, galena, amberjack sphalerite, and chalcopyrite. Typically all sulfides are anhedral and fine grained; exceptionally sphalerite grains obtain dimensions of one inch in diameter. Amberjack sphalerite is relatively rare, and where present is invariably rimmed by blackjack. Galena too is rimmed and/or corroded by blackjack. This suggests an early phase of skarn mineralization consisting of low temperature iron-poor amber sphalerite and galena, followed by higher temperature, iron-rich black sphalerite, pyrite, and minor chalcopyrite. Very rare green sphalerite occupies an unknown position in this paragenesis.

Form. Two types of skarn-related base metal mineralization are present. One consists of mineralization which forms an integral part of the skarn occurring as disseminations, veinlets, and bands, while the other appears to be manto-type mineralization with relatively narrow skarn alteration selvages. The first type of mineralization varies in intensity from sparse, fine grained disseminations in which pyrite, galena, and sphalerite for only 1-2% of the skarn. More intense mineralization is marked by the appearance of veinlets and narrow bands of sulfides making up 3-5% of the

rock. Most intense skarn mineralization is marked by irregular semi-massive "knots" of sulfides which locally make up 10-15% of the skarn. Such mineralization rarely exceeds intervals greater than 6". Chalcopyrite accompanies the other base metal sulfides only in this most intense style of mineralization. The second, or manto-type skarn-related mineralization is very similar to base metal "mini-mantos" described above, but have not been observed to exceed 1.5 inches in thickness. They differ, from those previously described, in having narrow selvages, one to three inches thick, of skarn minerals (garnet, vesuvianite, wollastonite, etc.); the entire assemblage occurring in unaltered or recrystallized limestone. Intergranular relationships suggest that, in this type of mineralization, a thin skarn manto developed first, with later base metal mineralization replacing the central part of the skarn.

Host Rocks and Associated Alteration. Mineralized skarn is found in every carbonate bearing lithology in every formation cored during the program, but is best developed in the Earp. The Earp was probably most susceptible to skarning because of the "dirty", argillaceous nature of the limestones, and the numerous, thin clastic units interbedded throughout the carbonate horizons. The Colina, being the "cleanest" carbonate formation cored, has relatively few, thin skarn horizons. Where best developed in the Earp or other formations, skarn has completely replaced the rock leaving no residual carbonate. Such skarn is composed of quartz, tan or

green garnet, wollastonite, vesuvianite, and rare brown pyroxene, which occur in widely varying proportions. Retrograde (?) chlorite, epidote, actinolite, and clays are generally unimportant constituents. Most skarn zones encountered in the drilling, then, appear to be prograde, an observation in accord with the increasing temperature suggested by the paragenesis of skarn-related base metal mineralization.

Metal Values. Only the more massive skarn-related replacement zones were assayed. A one foot section of py>sl>gl in a strong Earp limestone skarn assayed 1.09 ppm Au, 13.42 opt Ag, .38% Cu, 5.1% Pb, and 3.66% Zn. Another similar zone in the Earp assayed .03 ppm Au, 1.15 opt Ag, .16% Cu, 1.79% Pb, and .09% Zn. A one foot section of Earp garnet-vesuvianite skarn containing a two inch gl-cpy-py-sl vein assayed .14 ppm Au, 2.05 opt Ag, .33% Cu, 1.52% Pb, and .72% Zn. A 1.5 inch "mini-manto" with a skarn selvage in the Colina assayed over one foot (note the very large dilution) yielded the following: .01 ppm Au, 21.09 ppm Ag, .16% Cu, 2.52% Pb, and 1.73% Zn.

Fracture-Controlled Mineralization

This classification embraces vein mineralization as well as fracture- fault-, and breccia-related mineralization. It does not include the skarn-related vein and veinlet-controlled sulfides discussed above.

While mineralization of this classification is very widespread in all of the Tombstone drill holes, it is volumentrically insignificant, especially in the case of base metal sulfides. It is important to point out, however, that most mineralized fractures are high angle. Since the Tombstone drill holes were vertical or nearly so, the abundance and importance of this type of mineralization may, accordingly, be underestimated.

Mineralogy. All of the base metal sulfides discussed above, along with pyrite and manganese oxide minerals occur as fracture-controlled mineralization. Significantly, though, fault and breccia zones, as well as intervals of unusually high fracture density, are almost exclusively mineralized by manganese oxide minerals and finely disseminated pyrite. Base metal sulfides do not occur in such zones. Galena, sphalerite, and chalcopyrite, as well as pyrite occur in veins and veinlets which are isolated from intervals of major structure, suggesting mineralized fractures may predate many of the major structures found in the core. Of possible significance, too, is the fact that base metal sulfides (as well as fluorite) most commonly occur in high angle ($\geq 80^{\circ}$) fractures, and often leave coexisting (but not necessarily coeval) flatter fractures barren. Sphalerite is the most common base metal sulfide found in these fractures, followed by galena; chalcopyrite is uncommon. Where both amberjack and blackjack are present, the former is always rimmed by the latter, as is the case with skarn-related sphalerites. Only

the larger veins contain significant gangue minerals. Quartz and calcite are the most common; the former is most closely associated with base-and precious metal-bearing veins, while the latter is more commonly associated with pyrite- and/or manganese oxide-bearing veins. Rhodochrosite and fluorite are uncommon gangue minerals.

Form. Mineralization in the classification occurs as fracture fillings, ranging in thickness from paper thin up to .1 inch across, and in veins up to two inches thick. As noted above, most mineralized fractures and veins have high-angle orientations. Fracture fillings tend to be tightly filled with pyrite and/or base metal sulfides, while veins (>.1") are commonly vuggy and contain clusters of euhedral gangue minerals: quartz, calcite, or fluorite. Dustings of iron or manganese oxides typically coat gangue or sulfide minerals in such vugs. Crustified veins are apparently quite rare; only a few were found in core from T5. These are one to two inches across and consist of thick outer layer of brilliant pink, acicular rhodochrosite, followed by a band of dense white quartz, and are cored by irregular masses of amberjack and pyrite.

Host Rocks. Fracture-controlled mineralization occurs in all lithologies cored. Fracture-controlled pyrite and manganese oxides are very non-specific in there occurrence, showing no preference among the various carbonate and clastic lithologies present. Base metal sulfide-bearing fractures and veins, conversely, show a distinct preference for carbonate

units, but apparently none between limestone and dolomite. Only rarely are tiny sphalerite veinlets observed in siltstone or shale units.

Associated Alteration. Alteration haloes around veins and fracture fillings in the Tombstone core are remarkably rare, and when present are exceedingly thin - much thinner than the half-width of the associated vein. Fracture fillings usually have no associated alteration with the exception of those containing manganese oxides minerals. These rarely have thin selvages of manganese dendrites and weak argillic alteration. Larger veins occasionally have thin bleached haloes, and, in the case of quartz-rich veins, an irregular halo of weak silicification.

Manganese Oxide Replacements

Two distinct types of manganese oxide mineralization are apparent in the Tombstone area. The first type embraces weak disseminations, fracture coatings, and dendrite development which is widespread in the upper parts of the drill holes and of more sparing occurrence deeper in the holes in highly fractured or faulted areas. This type is probably related to supergene processes. The second type, probably directly related to hydrothermal processes, are massive replacements of limestone by manganese oxides which occur in drill holes T1, T4, and T5. A third type, manganese oxides which form apparent haloes around base metal mantos have been discussed in a previous section.

The first, or "supergene" type is briefly described here and will not be considered further in the follow-on discussion. This type of manganese mineralization is found mainly in the upper parts of the drill holes: above 640 feet in T2, above 395 feet in T3, above 490 feet in T4, and above 545 feet in T5. These intervals correspond roughly to the modern water table. In addition, this type of mineralization occurs deeper in the drill holes, but only in areas of brecciation, faulting, or dense fracturing. These data imply that this type of mineralization is related to supergene processes or circulating groundwater. The nature of the mineralization, too, suggests supergene redistribution of manganese, as the oxides occur primarily as dendritic fracture coatings or as weak impregnations in porous lithologies such as sandstone or arkose. Massive manganese oxide replacements are considered below.

Mineralogy. The major manganese oxide in massive replacements is a fine grained, black, sooty mineral which is probably a mixture of pyrolusite and psilomelane. A few of the replacements contain a compact, dense, heavy manganese mineral which may be manganite. X-ray diffraction studies would be needed to positively identify the minerals occurring in these deposits. Manganese-rich replacements occur in T4 which also contain wulfenite and mimetite. These are discussed in a separate section, but it should be borne in mind that they may be related to the purely manganese oxide replacements of the present discussion.

Form. Manganese replacements are intervals of limestone which have been replaced by between 20 and 100 percent manganese minerals. The foot and hanging wall are well-defined and usually sharp, although weak dendrite-type mineralization or pink limestone may extend several feet from the massive interval. Thicknesses of massive or semi-massive mineralization range from six inches to 6.5 feet. Where bedding in the host limestone can be determined, the foot and hanging wall of the manganese replacements appear to be parallel or nearly so. This type of mineralization, then, appears to take the form of relatively thin mantos.

Host Rocks. Manganese mantos have only been found in limestone hosts. In DDH T1, a 6.5 foot manto occurs in strongly recrystallized Colina limestone. In T4, five mantos, between one half and three foot thick, also occur in recrystallized Colina. In T5, a one foot thick semi-massive manto occurs in moderately recrystallized Horquilla limestone.

Associated Alteration. The manto in T1 shows no hanging wall alteration, but a one foot interval of weak to moderate sanding is present in the immediate footwall. Mantos in T4 are surrounded by up to 15 feet of weak manganese oxide dendrite development, and the T5 manto has a two to three foot thick halo of pink manganiferous limestone alteration surrounding it.

Metal Values. The mantos in T4 and T5 have generally low metal values. Assay ranges are as follows: .01-.07 ppm Au,

1.58-11.73 ppm Ag, 5 ppm - .01% Cu, 76 ppm - .33% Pb, and 98 ppm - .27% Zn.

Base Metal Oxide Mineralization

Mineralization in this classification bears many similarities to the ore that was mined during the heydays of the Tombstone district. Similar in both mineralogical composition and in physical form, the base metal oxide intercepts from the present drilling program differ from the old bonanza ores in grade, thickness, and depth of occurrence. Only three intervals containing base metal oxides were encountered during the drilling; all are in DDH T-4.

Mineralogy. The mineralogy of the "ore" and gangue minerals in the three intercepts is remarkably similar, with a few exceptions as noted below. Of the "ore" minerals, the lead oxides are the most common. Mimetite ($Pb_5(AsO_4)_3Cl$) is the most abundant, occurring as yellow-green, or lemon-yellow pseudo-hexagonal crystals up to .1" long, which line fractures or vugs. Wulfenite ($PbMoO_4$) is almost as common. It occurs as thin, delicate brilliant orange to red-orange panes, frequently twinned, and reaching .5" in size. Cerrusite is probably present but is too fine grained to be identified. No discrete zinc oxide minerals (smithsonite, hemimorphite, etc) were identified in any of the three intervals, but assay data suggests their presence. Silver oxides, notably bromargyrite (AgBr), are apparently very rare. Sooty black manganese oxides are present in two of the three intercepts. One intercept contained a sky blue mineral tentatively identified

as aurichalcite [$(Zn,Cu)_5(CO_3)_2(OH)_6$]. Gangue minerals include quartz, calcite, and fluorite. Quartz forms tiny crystalline druses, or occurs as multiple generations of botryoidal crusts. Calcite is either crystalline (tiny scalenohedra) or massive, and ranges in color from black (manganiferous) to clear, to brilliant yellow (iron oxide-bearing). Fluorite is abundant as a gangue mineral and occurs as coarse druses of perfectly euhedral white to clear cubes. Orange iron oxides and thin films of manganese oxides commonly coat all "ore" and gangue minerals in these assemblages.

Form. Two intercepts, those at 1320' (5' thick) and 1470' (2' thick) appear to have a manto-like form. Both foot and hanging wall contacts are sharp and well-defined. While bedding is difficult to discern in the strongly recrystallized host rock, the contacts of the mineralized intercepts are parallel to stylolites and, therefore, probably also to original bedding. Mineralization is clearly of a replacement nature; no vein-like characteristics are present. The margins of the intercepts are composed largely of manganese oxides in a quartz-calcite matrix, juxtaposed against unaltered limestone. The interiors are very vuggy; some open spaces approach one inch across and are lined with crystals or druses of ore and gangue minerals.

The third intercept, at 2845', has an entirely different form, appearing to be weakly mineralized cave fill, lying immediately beneath a 13 foot natural void. Because of its

unusual nature and its potential importance is future exploration, this occurrence is described, in detail, below:

2792-2798':	recrystallized light gray, stylolitic limestone.
2798-2800':	as above, but containing 1/2" vugs containing orange calcite crystals (dog tooth spar) and amorphous clots of manganese oxides. Several fractures at 20° to core axis, haloed by manganese oxide dendrites and finely disseminated pyrite are present.
2800-2822.5':	recrystallized white limestone with numerous thin seams of talcy clay at 30° to core axis. Specks of manganese oxides and orange carbonate scattered throughout.
2822.5-2823':	white, slightly gritty, weakly sanded, recrystallized limestone.
2823-2836':	void; possible oxidation cave.
2836-2836.5':	very vuggy limestone. Vugs lined with perfectly clear rhombs of iceland spar; accompanied by white, sectile clay.
2836.5-2837':	pulverent orangish-gray clay with calcite crystals scattered throughout.
2837-2842':	very porous and vuggy limestone; vugs lined with calcite and quartz druses and with gray clay; numerous quartz and calcite veinlets. Strong iron oxide Liesegang banding is offset by 80° micro-faults.
2842-2844':	as above, but contains angular 1" fragments of argillized siltstone. Interval suggestive of a collapse breccia.

2844-2852': assayed interval. Very similar to unit immediately above. Vugs filled with pulverent bright orange iron oxides, and calcite crystals (scalenohedra with growth patterns outlined by iron oxides). Brilliant red-orange wulfenite panes and doubly terminated yellow-green mimetite crystals form druses in vugs and along fractures. Possible trace cerrusite and bromargyrite along open fractures.

2852-2865': recrystallized stylolitic limestone. Upper contact sharp; upper one foot contains only very rare tiny vugs and thin clay seams.

Host Rocks. The base metal oxide intervals at 1320' and 1470' occur in moderately recrystallized Colina limestone, while that at 2845' occurs in moderately to strongly recrystallized Earp limestone. In all three cases, the marble is clean, save for the presence of organic-rich stylolites. The lack of a silty or argillaceous component is indicated by the total absence of skarn minerals in either the hanging or footwall limestones of the mineralized intervals.

Associated Alteration. The alteration in the 2845' occurrence is adequately described above. The 1320' occurrence shows a weak halo of manganese oxide, both as dendrites and fracture-fillings extending 13 feet into the hanging wall and 13 feet into the footwall where it is accompanied by minor pink manganiferous limestone. The 1470' occurrence shows a similar, but weaker manganese halo. It is accompanied, however by a zone of high angle fractures lined with fluorite, which extends nine feet into the hanging wall.

Metal Values. The best one foot of the 1320' occurrence ran .14 ppm Au, 32.33 opt Ag, .09% Cu, 1.27% Pb, and 1.60% Zn,

while the best one foot of the 1470' zone assayed .07 ppm Au, 2.84 opt Ag, .02% Cu, 2.8% Pb, and .21% Zn. The best one foot assay interval in the 2845' occurrence ran .07 ppm Au, .32 opt Ag, .01% Cu, .21% Pb, and .48% Zn. The reader is referred to the T5 log for complete assay information. It is noteworthy that assays of the complete intervals show that in these oxidized mineral occurrences the values for lead and zinc are almost equal and that zinc values, in places, exceed those for lead. Unoxidized base metal "mantos" at Tombstone usually show nearly equal lead and zinc values, or lead exceeding zinc. Insofar as zinc, in an oxidizing environment is far more mobile than lead, it is usually the case that oxidized mantos (at, for example, Leadville and Santa Eulalia) are strongly depleted in zinc by descending ground water. The values shown by the above three intercepts, accordingly, suggest in situ oxidation with little or no transport of the metal components away from their initial site of deposition.

STRUCTURAL GEOLOGY

One of the major thrusts of the Tombstone drilling program was to explore for manto mineralization in ground adjacent to major structures rather than to specifically target chimney-type mineralization within the structures themselves. The structures that were cut by certain drill holes were the result, then, of needing to explore footwall and hanging wall rocks, not of targeting the structure per se. The result of this approach was that little new information was generated concerning specific structures (i.e., the Lucky Cuss fault zone, etc). In some cases (e.g. T5) the nature and geometry of certain target-related structures became even less clear as the result of drilling. On the other hand, the wide scatter of hole locations generated some unexpected inferred data concerning major structures heretofore unknown. The following sections describe both the structural data directly observed in the drill holes, and those structures which drilling data imply to exist.

Observed Structural Data

Lucky Cuss Fault Zone. DDHs T1, T3, and T4 were designed to explore ground in the hanging and footwalls of the Lucky Cuss fault zone. All were vertical holes of depths judged sufficient to cross the fault where it cut suitable carbonate host rocks deep in the Paleozoic section.

Drill hole T1 was collared 900 feet due East of the Lucky Cuss headframe where the fault zone strikes nearly north-

south. Data gathered from the accessible mine workings, as well as from published cross sections, indicates that the Lucky Cuss fault (between the surface and 400 feet underground) dips eastward at 70°. The planned fault intercept was 2,460 feet. It is most likely that the Lucky Cuss fault was actually cut at 2,655 feet, indicating on overall surface to intercept dip of 72°. At this depth, the fault is represented by a three foot calcite-cemented breccia zone in a nine foot thick shale sandwiched between two massive Earp limestone beds. The breccia contains only weak, disseminated pyrite mineralization. Weak to moderate galena-sphalerite replacements occur, however, in the hanging wall limestone immediately above the fault.

Drill hole T3 was collared 450 feet east and 100 feet south of a large glory hole resulting from the mining of a 50 foot diameter chimney of argentiferous manganese oxide ore localized on the Luck Cuss fault. The fault in this area strikes almost due north and underground data indicated a southward rake of between 85° and near vertical. Measured surface and underground dips ranged from vertical to as low as 55° E. The planned fault/chimney intercept, assuming a 80°E dip and 87° rake, was 2,480 feet. The fault was actually cut at 2,426 feet, indicating an actual overall dip of 79°E. Several fractures, measured above and below the fault, dip between 70° and 80° which generally agree with the projected fault dip. The fault zone itself is seven feet thick and consists of sheared and brecciated, calcite- and quartz-

cemented arkose which contains several intervals of strong manganese oxide mineralization both as replacements and as vug and fracture fillings. No base metal replacements occur in immediate hanging or footwall limestones. The targeted chimney either dies out above the intercept depth, or was missed by the drill hole because of a change in rake.

Hole T4 targeted the down dip extension of mineralization at the Luck Sure Mine. The hole was collared 600 feet east of the mine openings where the Lucky Cuss fault still strikes almost due north before starting a sharp swing to the east (see Plate 1). Surface dips on various strands of the Lucky Cuss in the mine area range from 75°E to 85°E. Assuming an average dip of 80°E, the planned fault intercept was at 2,830 feet. This point lies nearly in the center of the 13 foot natural cave intersected between 2,823 and 2,836 feet. Fracture angles in rocks of the immediate foot and hanging wall tend to support an 80° fault dip. The nature of the mineralization associated with this intercept is described in detail in a previous section.

The intercept widths of the Lucky Cuss fault may appear surprisingly narrow. They are not uncharacteristically so, however, when compared to numerous segments of the Lucky Cuss observed both on the surface and underground where the width pinches and swells dramatically both along strike and down dip. Continuous exposures along several levels of the Lucky Cuss mine show the fault varies from a few inches thick in barren areas, up to perhaps ten or twenty feet in mineralized

areas (the exact width being obscured by replacement mineralization). Width may vary from one extreme to the other over a strike length of only a few feet. Accordingly, it is concluded that, although stratigraphic displacements could not be determined either underground or in core, the nature, dip, and intensity of faulting along the Lucky Cuss does not significantly change from the surface to the depths drilled.

Westside-Eastside Fissure. DDH T2 was collared near the intersection of the Westside-Eastside fissure, the Grand Central fault and the Tribute dike. Near the collar location, the dike dips west at 85° and the fissure dips 75° northwest (see Plate 1). Published cross sections and underground measurements in the Westside mine, however show the fissure to have an overall vertical to steep southeastward dip. It was anticipated, therefore, that the drill hole would pierce the dike-fissure intersection at depth, somewhere in the middle of the Naco section. Drilling results, however, showed otherwise. Neither the Tribute dike or the Eastside fissure were cut in the hole, indicating that both either maintain a vertical dip or reverse their indicated dip at depth. The presence of a thick section of Scherrer formation in T2 is undoubtedly due to faulting which may involve some movement on the Eastside fissure. It is probable, however, that pre-Bisbee faulting is also involved, as will be discussed in a subsequent section.

Empire Dike and Breccia Pipe (?). DDH T5 targeted mineralization associated with a strong breccia occurring at the intersection of the Empire dike and the Silver Thread roll. Neither the dike or the roll crop out on the surface, but both are mapped in detail on the 400 and 500 level of the Empire Mine. Careful delineation of the breccia mass and associated structures in the Benton-Albert stopes showed, on two levels, that the intersection of the vertical dike and roll axis had produced a vertically oriented breccia with a pipe-like geometry. T5, accordingly was targeted to intersect the breccia approximately 1,500 feet vertically below the breccia exposed on the 400 and 500 levels. As was the case with T2, the target was missed completely - neither the breccia or the dike were cut by the drill hole. The structural implications of the "miss" are as follows: 1) since the drill hole was oriented almost at right angles to the dike which was never cut, the dip of the dike must have changed from vertical to westward (away from the hole) at depth, and 2) the existence of the associated mineralized breccia at a depth of 2000 feet can neither be proved or disproved by this drill hole since the associated Empire dike was never penetrated, and there is no way of telling how closely the hole approached the dike along its course.

Implied Structural Data

Perhaps the most important structural data generated by the program can not be observed directly in the core, but rather is implied, based on drill hole stratigraphic

information. In the following discussion reference is made to Plate 2 which shows the stratigraphic correlation between all of the Tombstone drill holes.

Inter-hole correlation clearly shows that the Paleozoic section has been affected by major faulting that is not expressed in the Bisbee and therefore must be pre-Bisbee in age. Evidence for this is found in the stratigraphy of holes T2 and T5. In DDH T2 a thick section of Scherrer is present immediately below the undisplaced Bisbee unconformity and above a severely foreshortened section of Epitaph. One solution to the geometry so imposed is shown on Plate 2 which suggests the Scherrer was faulted in on a generally east-dipping normal fault which also "decapitated" the upper parts of the Epitaph. The east dip is required to maintain the inter-hole stratigraphic integrity shown between T1, 3, and 4. In T2, the missing part of the Epitaph suggests a fault displacement exceeding 500 feet.

Diagonally across the Tombstone basin, DDH T5 revealed that the Horquilla limestone immediately underlies the Bisbee unconformity which, as in T2, shows no apparent displacement. The existence of the Horquilla in this location implies that the area containing holes T1-4 has been downdropped in excess of 2,300 feet relative to T5. Such a pre-Bisbee displacement may have occurred along one major fault as shown on Plate 2, or may represent the cumulative displacement of a series of west-dipping, west side-down step faults between T2 and T5.

Another noteworthy feature of Plate 2 is the apparent "flatness" of the Bisbee unconformity between drill holes T3, T1, T2, and T5. Closer spaced drilling might reveal local irregularities, but, in general, the unconformity would still maintain a fairly constant elevation. This implies that post-Bisbee faults (i.e. most of the faults within the Tombstone basin shown on Plate 1) did not produce significant vertical displacement. This is in accord with published mapping and with personal observations both on the surface and underground. The literature also suggests that lateral movement on such structures was minimal.

The only exception to this generalization, documented by the present drilling program, is the apparent movement on the Lucky Cuss fault. Examination of Plate 2 shows that the contacts between the various Paleozoic units in hole T3 are displaced sharply downward relative to those in T4, as is the Bisbee unconformity. Recognizing the distortions inherent in the diagram, and the presence of several cross faults (Plate 1), it still appears that these displacements are the result of drag, or successive, closely spaced stepwise displacements, caused by movement on the Lucky Cuss fault (compare Plates 1 and 2). If this is true, it can be further noted that the contact displacements decrease in magnitude upwards. Between T3 and T4, the Earp-Colina contact is displaced downward by 811 feet, the Colina-Epitaph contact by 640 feet, and the Epitaph-Bisbee unconformity by only 187 feet. These figures imply that the Lucky Cuss fault has been in existence at least

since Colina, and probably Earp time, and moved, perhaps as a growth fault, through Epitaph time. Movement continued or was reactivated in Bisbee time, offsetting the unconformity. If this analysis is correct, it marks the Lucky Cuss fault as one of the more important and fundamental elements of the structural fabric of the Tombstone district.

Santa Fe Pacific Mining, Inc.

6200 Uptown Blvd. N.E., Suite 400
Box 27019
Albuquerque, New Mexico 87125
505/881-3050

May 1, 1989

FEDERAL EXPRESS

Mr. LaVerne Baxter
Tombstone Development Company
Route 2, Box 67
Grand Island, Nebraska 68803

Tombstone Project
Cochise County, Arizona
File 3-033-000 1

Dear LaVerne:

Santa Fe will commence its 1989 drilling program on the Tombstone Development Company lease May 1st. This years drilling program will consist of one rig and will be as follows:

1. T-6 will be drilled on the Luck Sure Patent at the same location as last years hole T-4. This hole will be drilled first.

2. T-7 will be drilled on the West Side Patent.

3. T-8 will be drilled on the Contention Patent.

4. T-9 will be drilled on the Silver Thread Patent at the same location as last years hole T-5.

I will supply you with a map of all drill sites prior to the completion of the drilling of T-6.

If you have any questions, please call.

Very truly yours,

Dennis Cole

Dennis Cole
Manager-Land

DC:dlu

Attachment

cc: W.D. Riesmeyer

REPORTS AUG., 1989

Semi-Annual Report to Tombstone Development Company

on the

Tombstone Project, Cochise County, Arizona

W. D. Riesmeyer
Santa Fe Pacific Mining, Inc.
September, 1989

Santa Fe Pacific Mining, Inc.

6200 Uptown Blvd. N.E., Suite 400
Box 27019
Albuquerque, New Mexico 87125
505/881-3050

September 11, 1989

Re: Tombstone Project
Cochise County, Arizona
SFPM File 3-033-0001

Mr. LaVerne Baxter, President
Tombstone Development Company
P. O. Box 1445
Grand Island, Nebraska

Dear LaVerne:

Attached in accordance with the term of the Lease between Tombstone Development Company and Santa Fe Pacific Mining is the semi-annual report covering Santa Fe's work during this period of time.

If you have any questions concerning this report, please feel free to call either me or Duncan Riesmeyer of this office.

Very truly yours,

Dennis Cole
Manager-Land

DC:fy

Attachment

cc: D. Riesmeyer

Semi-Annual Report to Tombstone Development Company
on the
Tombstone Project, Cochise County, Arizona

Introduction

Santa Fe Pacific Mining, Inc. conducted diamond core drilling on the Tombstone Development Company lease between May 1 and August 7, 1989. Two deep core holes (T-6 and T-8), with an aggregate footage of 4,200', were completed during the period. Extremely difficult drilling conditions, with attendant increased costs, prevented completion of the anticipated four hole program.

The following report describes the results from the two drill holes. Included are descriptions of the stratigraphy, structure, and mineralization encountered in each hole. A geologic map showing the location of each hole, as well as graphic logs for T-6 and T-8 are appended as Plates 1 and 2, respectively. Complete drill logs and assay sheets form an appendix to the report.

Diamond Drill Hole T-6

DDH T-6 was drilled between May 1 and June 10, 1989, on an asimuth of S85W at -80 degrees from the collar of DDH T-4 (see prior report). T.D. was 1,900'. The bearing of the hole was a direct line between the T-4 collar and the main shaft of the Luck Sure workings, which exploited a chimney of argentiferous manganese and lead oxide ores, lying within the Lucky Cuss fault. Drill hole T-6 was sited to explore for similar chimney and attendant manto mineralization in and adjacent to the Lucky Cuss where the fault was projected to cut the Paleozoic limestones of the Earp formation, apparently 1700 feet below the surface. The proposed intercept laid on a straight line projection between the outcrop of the Luck Sure mineralization and the oxidation cave, and accompanying mineralization, cut in T-4 at a depth of 2840 feet, which is thought also to lie in the Lucky Cuss fault zone.

Stratigraphy

DDH T-6 cut a section which included the Bisbee, Epitaph, Colina, and Earp formations. A complete stratigraphic description of these formations is included in a prior report; only a brief summary description will be given here.

Bisbee Formation. Rocks of the Cretaceous Bisbee formation were cored from the collar to 672 feet. The bulk of the unit consists of a generally coarse polylithic conglomerate, with clasts

in some sections reaching boulder size. Clasts consist primary of underlying Paleozoic units - limestone, marble, sandstone, siltstone, and shale, which are supported in a generally calcareous, sandy matrix. The second most abundant Bisbee lithology is fine to coarse sandstone, quartzite, and arkosic sandstone. The lower-most part of the Bisbee consists of siltstone and mudstone.

Epitaph Formation. In T-6, the Pennsylvanian-Permian Epitaph formation, consisting primarily of limestone and siltstone was cored between 672 and 1088 feet. The upper part of the unit is composed of fine siltstone and interbedded sandstones and arkose. The bulk of the unit is light grey limestone which has been recrystallized to a medium grained marble. The bottom of a lower siltstone unit marks the contact with the underlying Colina limestone.

Colina Limestone. The Colina limestone, cored between 1088 and 1521 feet, is also of Pennsylvanian-Permian age, and consists almost entirely of white to light grey, coarsely crystalline marble. Rare, thin dolomitic sections are present, as well as healed collapse breccia, and thin siltstone intervals. A small solution cavity and a four foot jasperoid interval were encountered in the upper part of the unit. The appearance of the first significant siltstone at 1521 feet marks the contact with the underlying Earp formation. A thin fault sliver of white marble between 1740 and 1750 feet is also tentatively assigned to the Colina.

Earp Formation. The Pennsylvanian-Permian Earp formation was cored between 1521 and 1738 feet and between 1750 and 1900 feet. It consists of limestone, calcite marble, and dolomite, along with interbedded siltstone, sandstone, and arkose. Coarse recrystallization of the limestones in the upper part of the unit make the distinction between the Colina and Earp carbonates difficult.

Structure

Despite the number of faults and breaks mapped on the surface between the Luck Sure shaft and the collar of T-6, drilling showed very little structural disruption of the section except in the Bisbee, and in and near the Lucky Cuss fault. The contact between the Epitaph and Colina, and between the Colina and Earp formations can be readily correlated between holes T-4 and T-6, both dipping eastward between 45 deg. and 50 deg. This is in accord with bedding angles measured in both holes which generally range between 40 deg. and 60 deg. The numerous faults, noted on the accompanying drill logs, which cut the Paleozoic section, are generally high

angle, but, as shown by hole to hole correlation, have only minor vertical offset.

A complication to this apparently simple structural picture is found in the attitudes of the Bisbee beds and the Bisbee-Epitaph contact. In both T-4 and T-6, bedding in the Bisbee dips very steeply - between 70 deg. and 90 deg., up to 50 deg. steeper than that of the underlying Paleozoic units. In addition, correlation between T-4 and T-6, shows the Bisbee - Epitaph contact to dip west at 6 deg. While this may be due to an extremely rugged unconformity surface, the attitude of the Bisbee beds suggest a tectonic cause. The shallow contact angle and the steep bedding angles suggest thrust faulting along the unconformity with possible overturning of the upper plate Bisbee. While there is some evidence of overturning reflected in the core, there is little or none of a thrust at the contact. For the time, the issue is unresolved.

The Lucky Cuss fault was intercepted in T-6 at 1738 feet, approximately 45 lateral feet from the projected intercept on the line between its outcrop at the Luck Sure and the T-4 intercept. Thus the Lucky Cuss dips 79 deg. between the surface and the T-6 intercept, and 75 deg. between T-6 and the oxidation cave in T-4. The cave and underlying mineralization encountered along the fault in T-6 suggest the Lucky Cuss zone to be about four feet thick, considerably thinner than the 20 foot thick section measured on the surface.

Mineralization

While several mineralized intercepts were obtained in T-6, none were of adequate grade and/or width to constitute ore. Of these, the three most significant are described below. Complete assay results for these and other assayed intervals are located in the appendix.

The interval 991.5'-992' contained a thin (0.5') replacement consisting of nearly massive blackjack sphalerite and minor disseminated galena. The intercept assayed 31.0 opt Ag, 0.81% Cu. 3.20% Pb, and 17.3% Zn. Mineralization appeared to be concordant with bedding and had razor-sharp contacts with the carbonate host. Mineralization occurred within an alteration shell of strongly recrystallized Epitaph limestone (marble). These characteristics suggest a typical CRD-type manto, albeit very thin. This "mini-manto" may conceivably be rooted in the Lucky Cuss fault, 500 feet distant, up dip along bedding. It does not, however, extend further down dip to T-4 only 285 feet away.

The interval 1185.5'-1187' is a vuggy, strongly oxidized zone in Colina limestone in the immediate footwell of a barren three foot thick jasperoid. The zone contains manganese oxides lining

vugs, as well as remnant kernels of galena (to 1" across), and scattered wulfenite. The zone assayed 3.28 opt Ag. 0.69% Pb, and 1.64% Zn. Projected 290 feet down dip along bedding to T-4, a silica-fluorite-pyrite-manganese zone is encountered which may be a manto-like correlative of the T-6 intercept.

The Lucky Cuss fault is probably represented by a two foot oxidation (?) cavern cut between 1738' - 1740', which is similar in nature to the cavern on the Lucky Cuss which was drilled in hole T-4. The T-6 cave (fault) has a siltstone hanging wall and a vuggy marble footwall. Unlike the T-4 cave, this cavern is floored only by vuggy, semi-massive manganese oxides; no wulfenite or anglesite was observed. Assays showed some lead oxides to be present, however, viz: 2 feet of 0.18 opt Ag, 0.06% Cu, 2.35% Pb, and 0.35% Zn. It is probable that the low Ag, Cu, and Zn values have resulted from migration of these metals away from this strongly oxidized zone, only the Pb remaining, fixed as oxidation zone-stable, fine grained cerrusite.

Below the cavern, zones of manganese oxide impregnations and dendrites occur in Earp limestones, the strongest of which lies between 1797.5' and 1802'. Assays show the manganese oxides to be argentiferous, carrying 0.88 opt Ag; no other significant metal values are present. It is probable that this MnOx zone is an alteration/mineralization halo related to the Lucky Cuss zone.

Diamond Drill Hole T-8

DDH T-8 was drilled between June 12 and August 7, 1989 from a site on the north end of the PBR Minerals open pit. The hole was drilled due west beneath the pit at an angle of -61 deg. T.D. was 2,300'. The hole was sited to explore the possible down dip extension of rich silver-gold ore associated with a generally north-trending complex of faults and the Empire-Contention dike. Published cross sections show bonanza-grade oxide ore was closely associated both with the margins of the dike and with the multitude of steeply dipping normal faults which progressively offset the dike westward. Because the best "shallow" ore was found where dikes or faults cut Bisbee limestones, it was believed that larger ore bodies might be found where the fault-dike system cut thick sections of Paleozoic carbonates at depth.

Stratigraphy

DDH T-8 cut a section consisting of the Bisbee formation and the Horquilla and Escabrosa limestones. These units are also thoroughly described in a prior semi-annual report, and only a brief summary of their characteristics is given below.

Bisbee Formation. Unlike the Bisbee drilled in T-6 which contained coarse clastic sediments - sandstones an conglomerates, the 802.7 feet of Bisbee drilled in T-8 consists of fine clastics - siltstone and mudstone, as well as limestone. Only rare, thin interbeds of sandstone or arkose were encountered in the section. The siltstones, in the upper 200 feet of the hole, are strongly shattered and altered, creating extremely bad drilling conditions. Drill progress, on occasion, was as little as one foot per 20 hour shift. Below the zone of shattering, the siltstones, black, tan, brown or red in color, are seen to have a variable sandy component and frequently grade into finer grained mudstones. Limestones showing varying degrees of argillization, dolomitization, and silicification, form interbeds, up to 50 feet thick, within the siltstone section.

Horquilla Limestone. The Pennsylvania-Permian Horquilla limestone forms the lower-most formation of the Naco group, underlying the Earp formation. The Horquilla was cored in T-6 between 802.7' and 1949.5'. The upper part of the unit is a thickly bedded, light grey to pinkish grey limestone which contains a few thin interbeds of siltstone. From 897' to 1332' the Horquilla is a limestone or dolomitic limestone breccia. Clasts average 2.5" to 3" across, and are supported in a calcite matrix. This sub-unit either represents a healed collapse breccia, or, more likely a tectonically shattered interval which was subsequently solution-healed with calcite. The lower half of the Horquilla in T-6 is composed of thickly bedded to massive, stylolitic, medium to coarse grained limestone which contains a few thick beds of dolomite and siltstone. Weak skarning affects the lower part of this limestone unit. The lower-most unit of the Horquilla is a thinly bedded dark grey to brown siltstone which disconformably overlies the Escabrosa.

Escabrosa Limestone. The Mississippian Escabrosa was cored between 1949.5' and T.D. at 2300'. The unit consists of thickly to massively bedded, moderately recrystallized, light to dark grey limestone, with lesser amounts of dolomite and dolomite limestone. Most parts have been affected by weak skarning and argillization. Stylolites are common throughout the section. Only one thin interbed of dark grey siltstone appears in the section.

Felsite Dike. A felsite dike intrudes the Escabrosa between 2179' and 2199'. The dike is an orangish cream aphanitic-porphyritic rock with a sharp footwall contact, but a very diffuse hanging wall contact. Phenocrysts consist of small plagioclase and potassium feldspar crystals, rare rounded quartz "eyes", and blackish green biotite books. The aphanitic groundmass is very siliceous and has the appearance of potassic flooding. The rock probably has a quartz monzonite composition. The dike contains no sulfides, and shows no trace of argillization, unlike most other dikes seen on the surface or underground in the district.

Structure. The lack of surface outcrops along the line of T-8, as well as poor pit exposures and the lack of underground and nearby drill hole data, make any structural analysis of T-8 extremely difficult and speculative. Despite these difficulties, the following observations are, nonetheless, offered.

Faults. Numerous faults were recognized on the T-8 core. Most have a dip ranging from 58 deg. to 78 deg.; regional structural data suggest that most, or all, dip eastward . Most show little or only moderate displacement, as differing lithologies or formations are not juxtaposed. The only apparent exception is a major fault very near the Bisbee-Horquilla contact. This fault, dipping eastward at 75 deg., when projected to the surface, corresponds closely to the location of the Contention fault as mapped by Butler. Because of its proximity to the formational contact, it is probable that the Bisbee has been down-dropped against the Horquilla along this structure. The northeast-trending Tranquility fault, approximately 600 feet north of the drill collar (see Plate 1), dips southeast and is probably responsible for down dropping the Bisbee-Horquilla contact approximately 245 feet relative to the position of the contact in DDH T-6 (see prior report).

As shown on Butler's cross sections, east-dipping faults progressively offset the contention dike to the west with increasing depth. No dike segments were encountered in T-8 with the exception of the above described felsite which occurs at a vertical depth of 1900'. Its projected position is 1000' west of the outcrop of the Contention dike as mapped by Butler. Drill data shows the felsite dike probably dips east at -60 deg. Its location and attitude militate against its being a segment of the Contention; it is more likely a segment of the Sulphuret dike which outcrops just west of the vertical projection of the bottom of T-8. The absence of segments of the Contention dike further up-hole is, at present, unexplained.

Folds. Various tectonic fabrics observed in the core, as well as known structural trends elsewhere in the district, suggest that T-8 passed through the axis of one or more folds. Unfortunately, because fabrics in drill core cannot be absolutely oriented in three dimensional space, the true dip and strike of bedding, recorded on the drill log, cannot be determined. Accordingly, on the basis of one drill hole, positive proof of a fold structure cannot be obtained. However, it should be noted that the trace of the Girard "roll" (anticline) projects across the course of T-8 (Plate 1). Manipulation of measured bedding angles in the core suggest that the axis of the roll may have been crossed between 1000' and 1300'. This corresponds to the location of the intense breccia cored in the Horquilla, as described above. It may be

speculated that this breccia formed as a result of shattering along the crest of the roll. That weak mineralization occurs associated with the bottom of this breccia unit may be analogous to roll crest replacements which are well documented elsewhere in the Tombstone district.

Mineralization

Mineralization occurs sporadically throughout the length of T-8. Most, however, is very weak. Only two intercepts yielded significant assay values, but those were not of sufficient grade and/or width to constitute ore. Assays for all intercepts chosen for analysis, in addition to the two discussed below, appear with the T-8 drill log in the appendix.

A three foot intercept, between 1648.6' and 1651.6', assayed 0.64 opt Ag, 0.62% Cu, 2.16% Pb, and 2.35% Zn. The mineralization consists of 20% coarsely disseminated sphalerite = chalcopyrite galena, hosted in strongly recrystallized and weakly skarned Horquilla limestone. Mineralization is accompanied by weak pink and black manganese oxides, as well as possible fine grained green garnet. In addition, the sulfides are surrounded by a halo of recrystallization up to 7 feet thick, and a shell of weak chlorite-epidote skarn up to 23 feet wide. There is no obvious structural control for the mineralization, and it is probable that it is a part of a weak bedding controlled skarn-sulfide manto system of unknown source.

The best mineralized interval in DDH T-8 occurs associated with the felsite dike between 2154' and 2177.5', in the dike hanging wall, and between 2198.5 and 2199' in the footwall. The hanging wall zone consists of up to 30% total sulfides including galena, sphalerite, chalcopyrite and chalcocite. Trace amounts of various copper oxides and wulfenite are scattered through the section. The average tenor of the interval 2154' to 2177.5' (23.5') is .002 opt Au, 1.14 opt Ag, 0.61% Cu, 6.54% Pb, and 2.57% Zn. Reference is made to the appendix for a complete tabulation of the metal values in this interval. The footwall intercept contains about 20% sulfides with a mineralogy similar to the section above. Associated alteration occurs mostly in the hanging wall and consists of weak recrystallization, and weak to moderate sanding. A one foot cavern, completely filled with massive crystalline calcite and dolomite occurs in the immediate footwall of the dike.

It will be noted that the felsite dike contains anomalous lead and zinc values only on its margins; the interior of the dike is completely barren. This, in addition to its megascopically unaltered nature and lack of even visible pyrite, suggests the dike

is post-mineral and was not the source of the surrounding CRD mineralization. Accordingly, it is suggested that mineralization is related to a pre-dike fault (the same as, for example, mineralization in the Westside fissure). Both the fault and mineralization are thought to have been subsequently intruded by the barren felsite.

SUMMARY

Two deep core holes were completed on the Tombstone Development Company lease as part of Santa Fe Pacific Mining's 1989 exploration program. A 1,900 foot hole was drilled in the Luck Sure mine area, and a 2,300 foot hole was cored under the PBR Minerals open pit. Both holes were targeted on major faults, the Lucky Cuss and the Contention fault complex, which hosted significant ore deposits in the near-surface environment. The holes were directed to intersect these structures at depth where they cut thick sections of Paleozoic carbonate rocks - locations holding potential for hosting large mantos and chimneys of CRD mineralization. Both holes cut the targeted structures, but found only minimal development of sulfide mineralization, the grade and/or thickness of which was inadequate to constitute ore.

APPENDIX

Drill Logs and Assay Sheets
for
DDH T-6 and DDH T-8

DIAMOND DRILL
HOLE T-6

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UJV 086
June 13, 1989
T-6 991.5-992

SANTA FE PACIFIC MINING INC.
Attn: Mr. Duncan Riesmeyer
6200 Uptown Blvd., #400
Albuquerque, NM 87125

Analysis of 1 Drill Core Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	Ag (oz/t)	Cu (%)	Pb (%)	Zn (%)
1	T-6 991.5-992	.002	31.00	.81	3.20	17.3

cc: Mr. Fred Jenkins
Mr. Dale Armstrong

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L.
LEHMBECK
DATE SIGNED
Arizona U.S.A.
6/13/89

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UJV 107
June 30, 1989
T-6 (1185.5 TO 1896)

SANTA FE PACIFIC MINING INC.
Attn: Mr. Duncan Riesmeyer
6200 Uptown Blvd., #400
Albuquerque, NM 87125

Analysis of 8 Drill Core Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	Ag (oz/t)	Cu (%)	Pb (%)	Zn (%)
1	T-6 1185.5-1187.5	.010	3.28	.04	.69	1.64
2	T-6 1597.5-1602	<.002	.07	.01	.04	.09
3	T-6 1741-1743	.008	.18	.06	2.35	.35
4	T-6 1770-1772.2	<.002	<.01	<.01	.02	.02
5	T-6 1779-1780.3	<.002	<.01	<.01	.01	<.02
6	T-6 1797.5-1800	<.002	.88	.02	.03	.32
7	T-6 1801.4-1802.4	<.002	.87	.01	.05	.18
8	T-6 1891.5-1896	<.002	.86	.02	.37	.35

cc: Mr. Fred Jenkins
Mr. Dale Armstrong

REGISTERED ASSAYER CERTIFICATE No. 9425 WILLIAM L. LEHMBECK ARIZONA U.S.A.

6/30/89

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFICATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
5	50	BISBEE		5																			Bisbee Fm: Sandstone; lt grey in color, fine → v fine grained, possibly beach sands (Aeolian?) calcite cemented (effervesces lightly).					
10	100			10																			9.2 Caliche layer {1 foot} fracture filling!					
15	100			5																			Fault, gouge & breccia {3"}					
20	100				65																							
25	100			10																								
30	100																											
35				5																								

page: 1

DRILL HOLE: T-6

page: 2

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
40		BISBEE		5	30																		BISBEE FM: SANDSTONE: Fine - medium grained to locally conglomeritic; clasts; sedsc, ls, shale & Qtzite. grey in color, Bedding 0~10° to core axis, locally fossiliferous, (Gryphea sp.); calcite cemented.					
45				5																								
50				5	70																							
55				0																								
60				5	40																μ							
65				5	0																K							
70				10	90																K							
				10	0																K							

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MANGANESE OXIDE (style, wms, mass)	GALENA-SPHALERITE (style, wms, mass)	DESCRIPTION	ASSAY DATA (page 3): Au	Ag	Cu	Pb	Zn
5/10 – 75 – 80 – 85 – 90 – 95 – 100 – 105	100 / 100 / 100 / 100 / 100 / 100 / 100 / 100	BISEE		20 / 5 / 10	20 / 20 / 20 / 65																		BISEE FM: WHITE – LT GREY SANDSTONE – LOCALLY GRADATIONAL W/ GRAVEL SIZED CONGLOMERATE (PEBBLE CONGLOMERATE). SS. IS MOD-MATURE {i.e. >90% QTZ, WELL ROUNDED, MINOR MAGNETITE, V. MINOR FSPAR}. SANDSIZE RANGES FROM CLAY SIZE ~ V. FINE SAND SIZE, GRAD. TO PEBBLE SIZE CLASTS {ONLY LOCALLY}. MINERALIZATION IS ONLY TRACE MnOx, BEDS ARE BIOTURBATED IN PART, CALCAREOUSLY CEMENTED.					

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA page: 4 Au	Ag	Cu	Pb	Zn
110	100			5	40																		BISBEE Fm: CONTINUED AS BEFORE. (SEE PAGE 3)					
					80																							
	100			10																			- NO FeOx -					
115					60																		- CALCITE VIENING V. MINOR {< 1/8" WIDE}					
	100			10																			CALCAREOUS CEMENT.					
120					0																		* CONGLOMERATE IS MATRIX SUPPORTED POLY-CLASTIC MUD-FLOW TYPE FAN-GLOMERATE.					
	100				0																							
125				0																								
					85																							
	100			0																								
130					90																							
	100			0																								
135					30																							
	100			0																								
140				5																								

5/11

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA page: 5 Au	Ag	Cu	Pb	Zn
145	100	BISBEE FM		5	5																		BISBEE SANDSTONE: INTRAGRADATIONAL W/ FAN-GLOMERATE. BEDDING IS NEAR 0° W/CORE AXIS. SS. IS CALCITE CEMENTED. MINOR MnO_2 DENDRITES ALONG FRACTURE FACES, MIXED CLAYS ALONG STRONG SLIP-FACES OF FAULTS & SOME JOINTS.					
				5	30																							
150	100			0	0																							
				0	5																							
155				5	0																							
160	100			0	80																		CONGLOMERATE ZONE.					
165				0	15																							
170	100			5	40																							
				0																								
175	100			0	30																							

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA page: 6 Au	Ag	Cu	Pb	Zn
	100	BISBEE		5	80																		BISBEE Fm: CONT. SEE PAGE 5.					
180				0																								
				0	70																							
185	100																											
				5	45																							
190																												
	100			0																								
195																												
				0	25																							
200	100			5																								
				0																								
205	100			0																								
	100				30																							
210	100			5																								

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)
215	100	BISBEE FM		5	30																	
220	100			5																		
225	100			0	45																	
230	100			0	85																	
235	100			5																		
240	100			0	20																	
245	100			5	10																	

DESCRIPTION

BISBEE FM: V. CONGLOMERITIC;
MATRIX SUPPORTED, POLY CLASTIC:
{SIZE ≈ 8" MAX ? PEBBLE
COBBLES & OCCASIONAL BOULDERS.
MATRIX SIZE: SILT ~ COARSE SIZE.
MOD ~ LIGHT CALCITE CEMENTATION.
- LOCALLY 4. FINE BEDDED SS. ~
SANDY SILTSTONE, 242'
EVIDENCE OF RIP-UP BEDS.
- DEPOSITION RATE MOD. HIGH.
- FINE BEDDED SUB-UNITS MAY
BE ALGAL-BOUNDSTONE IN
PART (?), NO CLEAR EVIDENCE
OTHER THAN FINELY LAMINATED.

DESCRIPTION OF CONGLOMERATE

1. CLASTS ARE ROUNDED ~
VERY ANGULAR. SIZE IS VARIABLE,
MUD & SAND SUPPORTED.

2. CLASTS MAY OR MAY NOT
BE IMBRICATED {PREFERENTIAL
ORIENTATION}

3. LITHIC FRAGMENTS OF:
- ABRIGO SS, STS, LS,
- COLLINA LS, MARBLE
- EPITAPH LS.
- EARP LS. STS.
- HORQUILLA LS.
- ESCABROSA LS.
- SUGAR LOAF VOLCANICS
- PIMA QUARTZITE.
- UNIDENTIFIED IGNEOUS ROCK
TYPES.

ASSAY DATA page: 7

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wrms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wrms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wrms, mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
		BISBEE FM		5	10																		BISBEE FM: CONT.					
					5																		SEE PAGE 6 & 7.					
				5																	H							
250	100				10																H							
				5	10																							
5/12				10	10																							
255				8																								
260	100			5																								
265				5																								
270	100			0																								
				5																								
275																												
	100			5																								
280																												

page: 3

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
285	100	BISBEE FM																					BISBEE CONGLOMERATE: CONT.					
290	100																											
295					45																							
300	100				0																							
	100				0																							
305					5																							
310	100				30																							
					50																							
315	100																											

page: 9

DRILL HOLE:

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
320	100	BISBEE FM		5	40																		BISBEE CONGLOMERATE : CONT.					
325	100			5	40																							
330	100			5	45																							
335				5																								
340	100			0																								
345	100			5	70																							
350				5																								

page: 10

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
355	100	BISBEE FM		5	80																		BISBEE CONGLOMERATE: CONT. SEE PREVIOUS DESCRIPTION. SILICIFIED STARTING @ 347					
360	100			5	0																							
365	100			5	45																							
370	100																											
375	100																											
380	100																											
385	100				50																		FAULT; SANDSTONE, FINE GRAINED WELL SORTED, MATURE, GREY-GREEN IN COLOR, CALCITE CEMENTED. & PART. SILICIFIED					

page: 11

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
390	100	BISBEE FM.			45																		BISBEE SEDIMENTS: SEE PREVIOUS DESCRIPTION. CONGLOMERATE SHOWS STRONGER IMBRICATION.					
395																												
400	100																											
405					30																							
410	100				0																							
415					0																							
420	100				3																							

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	BISBEE		5	30																		BISBEE SEDIMENTS : CONT.					
																							SEE PREVIOUS DESCRIPTION					
425																												
				5																								
430	100				45																							
				5																								
435																												
440	100				35																		CLAST SIZE INCREASING					
				5	5																							
445					0																							
				5	0																							
					0																							
450	100				10																							
				5	25																							
455																												

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
460	100	BISBEE		5	30																		BISBEE SEDIMENTS: CONT., SEE PREVIOUS DESCRIPTION					
465				5	45																							
470	100				30																							
475					30																							
480	100				45																							
485				5	60																							
490				5	45																							

ASSAY DATA page: 14

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
495	100	BISBEE		5	75																		BISBEE SEDIMENTS: CONT.) SEE PREVIOUS DESCRIPTION					
				0	30																							
500	100				50																							
				0																								
505					60																							
510	100				30																		LARGE RAFTED BOULDER OF COLUMA MARBLE (?) MINOR EPIDOTE PROPOLIZATION					
515					30																							
				0																								
520	100				25																							
525				0																								

page: 15

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
530	100	BISBEE		5	45																		BISBEE SEDIMENTS: CONT., SEE PREVIOUS DESCRIPTION.					
535				10	40																		CONG. DEMINISHING INTO SS. THEN SS.SILTSTONE. WELL SORTED FINELY LAMINATED TO BEDDED. MAUVE IN COLOR					
540	100			5	45																		SANDSTONE: WELL SORTED - BEDDED. QTZ. MATURE, CLEAN GREY IN COLOR					
545				5	40																		HORNFELSING PICKS UP @ 545'					
550	100			0	45																		BLEACHING IN PART					
555				0																								
560	100			5																								

ASSAY DATA

page: 16

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	GALENA-SPHALERITE (style, wms, mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
565	100			5	50																		BISBEE SANDY-SILTSTONE: MAUVE IN COLOR, SILTY ~ SANDSIZE CLASTS, BEDDING @ ≈ 5-10°, HORNFELSED IN PART; BLEACHED IN PART, NO FE-PYRITE OR OTHER MINERALIZATION. EPIDOTE ~ CHLORITIC ALTERATION IN PART; ARGILLIZED, IN PART, ALONG SHEARS, FAULTS, ETC.					
570	100			10	45																							
575																												
580	100			10	50																		590 ~ 599' AN ALTERATION PHENOM. CAUSING A "BRECCIA-LIKE" PATTERN. - POSSIBLY RELATED TO BLEACHING.					
585				15																								
590	100			15	50																							
595	100			15																								

page: 17

DRILL HOLE: 7-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
600	100	RISBEE Fm.		10																			BISBEE SANDSTONE ^ SILTSTONE: CONTINUED AS BEFORE.					
				5																								
605																												
610	100																											
615				0																								
620	100			0																								
625				0																								
630	100																						ZONE OF ARGILLATION & RUBBLE.					

page: 18

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	BISBEE FM		0	0																		BISBEE SILTSTONE - SANDSTONE: CONT. SEE PREVIOUS DESCRIPTION					
635				5	5																							
				5	0																							
640	100			12	5																		FAULT ZONE 641.7' ~ 645.9' BRECCIA >> GOUGE					
					45																							
645				12																								
				5	0																							
650	100																											
					5																							
655				12	12																							
660	100				12																		END OF BLEACHING.					
				12																								
665	100																											

ASSAY DATA page: 1/4

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
670	100	BISBEE		5	10																		EPITAPH SILTSTONES ~ MUDSTONES: F. grained SILT ~ V.F. GRAINED SAND, CALCAREOUSLY CEMENTED; F. BEDDED ~ F. LAMINATE IN PART; PRESERVED BEDDING AT 0 ~ 10°; BECOMING BLEACHED @ 682 ~ 701'; SMALL CALCITE VEINLETS THROUGH OUT					
675		EPITAPH DOL.		10	15																							
680	100			2																								
685				2																								
690	100				10																							
695	100			2																								
700				5																								

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)
705	100	EPITAPH DOL.																				
710	100				30																	
715																						
720	100				35																	
725																						
730	100				30																	
735																						

DESCRIPTION

EPITAPH SEDIMENTS: V.F. SANDSTONE ~ MUDSTONE. F. GRADED, BEDDED AND IN PART LAMINATED; OXIDE ZONE (ORANGE IN COLOR) 701' ~ 706, BELOW TAN ~ WHITE IN COLOR, CALCAREOUS IN PART; ARGILLIZATION & CHLORITIZATION LOCALLY.

NO SULFIDE MINERALIZATION.

ASSAY DATA

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
		EPITAPH DOL.		10																			EPITAPH SEDIMENTS: CONT. AS BEFORE.					
740	100				45																							
				15																			LIMESTONE ~ DIRTY TO SILTY IN PART; MASS. TO FINELY BEDDED; FOSSIL FRAGMENTS RECRYSTALLIZED.					
745																												
750	100			15																								
755				15	30																							
760	100																											
	100			20																								
765					45																							
	100																											
770																												

ASSAY DATA

page: 22

DRILL HOLE: T-U

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
775	100	EPITAPH Dol.		20	35																		EPITAPH SEDIMENTS: CONT. ALT DIRTY LIMESTONES ~ SILTSTONE SEE PREVIOUS DESCRIPTIONS.					
780	100			25																			LIMESTONES GRADING INTO MUDSTONE-SILTSTONE ~ SANDY SILTSTONE. {TRANSGRESSIVAL ONLAP} CALCAREOUS IN PART.					
785					30																							
				20	30																							
790	100																											
795				35																			LIMESTONE: LESS SILT, ETC, mod-RECrtlzd, Epidote "Blooms" ALTERATION LOCALLY; BROWN ~ Lt GREEN IN COLOR; MINOR CHLORITE ALT. THROUGH OUT. CALCITE VEINING THROUGH OUT.					
800	100				40																							
805				35																								

page: 23

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
810	100	EPITAPH DOL.		35	35																		LIMESTONE: SEE PREVIOUS PAGE: LOCAL FOSSIL "TRASH"					
815																												
820	100			35	35																							
					40																							
825																												
				40	40																							
830	100																											
					40																							
835																												
	100			40																			LOCALLY SILTY: I.F. BEDDED					
840					40																							

page: 24

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	F_2 OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
845	100	EPITAPH DOL.		10	20																		LIMESTONE: . CONTINUED, SEE PAGE 23.					
850	100			35	30																		SILTY LAYERS: V. FINELY BEDDED OR LAMINATED; DARK BANDING IN LS.					
855				35																								
860	100				30																		EPIDOTE - CHLORITE ALT. IS UNIFORM AND CONTINUOUS.					
865				3	25																							
870	100				30																							
875	100			10	30																							

page: 25

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA (page: 26): Au	Ag	Cu	Pb	Zn
880	100	EPITAPH DOL.		40	40																		LIMESTONE: CONT. SEE PAGE 23					
885				40	40																							
890	100			40																			LIMESTONE ~ LESS SILT: LT GREY IN COLOR.					
895				45	45																							
900	100			45	50																							
905				45	45																							
910	100			45																								

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
915	100	EPITAPH		10	70																		LIMESTONE: CONT. SEE PAGE 23					
920				15	85																		LIMEY SILTSTONE. CLAY ALT. (ARGILLIZED) AND CHLORITIZED IN PART, BLEACHED IN PART, WHITE – LT GREEN IN COLOR					
925	100			15	50																		LIMESTONE: AS ABOVE.					
930				15	50																							
935	100				50																							
940				15																								
945	100			15																								

DRILL HOLE:

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
950	100	EPITAPH		35	50																		EPITAPH : CONT. AS BEFORE.					
																							Epidote - chlorite "Blooms" - SEE PREVIOUS DESCRIPTION.					
					0																							
955	100			35	0																							
					0																							
				40	35																							
960	100																											
				25																								
965					45																							
																							LIMESTONE BECOMING MARBLE ↓					
970	100			20																								
					30																							
975					0																							
	100			20	0																							
980																												

page: 28

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA (page: 29) Au	Ag	Cu	Pb	Zn
985	100	EPITAPH DOL.		5	40																		EPITAPH: LIMESTONE, CONT AS BEFORE.					
990	100			35	50																		SEMIMASSIVE BLACK JACK SPHALERITE ≈2.5" WIDE VEIN. {CUT & ASSAYED}					
995				50																								
1000	100				45																		LIMESTONE ~ LESS RECRYSTALLIZATION, {NO LONGER MARBLE}					
1005				55																								
1010	100			50	40																		MARBLE — WHITE, VERY COARSELY RECRYST'D.					
1015																												

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
				45																			EPITAPH: CONT AS BEFORE, EPIDOTE "BLOOMS", mod RECRYSTLZD MARBLE. SPECKLED GREY IN COLOR.					
					45																							
1020	100	EPITAPH DOL.																										
1025				40																			MINERALIZATION: NONE					
					75																							
1030	100			35																								
1035																												
					60																							
1040	100			30																								
					60																							
1045																												
	100																											
1050				20																								

ASSAY DATA

DRILL HOLE: T-6

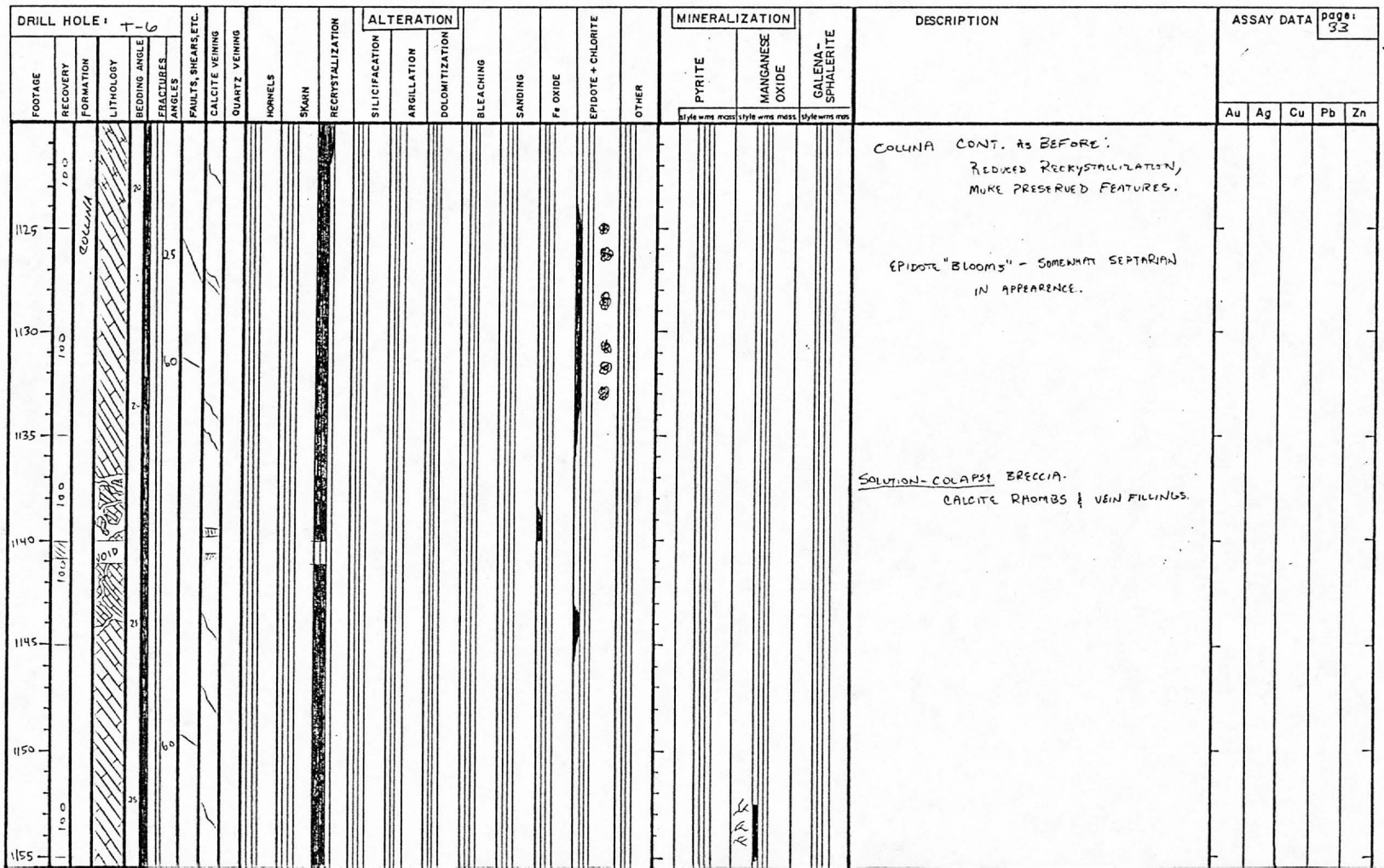
FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1055	100	EPITAPH DOL.		15																			EPITAPH. CONT AS BEFORE.					
				10																			DEPOSITIONAL CONTACT LS ↑ SILTSTONE ↓ 1057' @ 10°					
1060	100			10																								
1065				5																			BRECCIA ZONE: FAULT ANGLE & THROW UNK. DISSEM. PYRITE ~ AMARPJACK					
				10	?	?																						
1070	100					SILL																	CLAY ALTERED: {MOSTLY ALLOPHANE} YELLOW ~ YELLOW GREEN IN COLOR, WAXY IN TEXTURE, CROSSCUT BY NUMEROUS CALCITE VEINS.					
				10																								
1075																												
1080	100																						LIMESTONE: MARBLE ~ SEE ABOVE DESCRIPTION.					
				10																								
1085																												

page: 31

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
1090	100	EPITAPH / COLLINA LS		15	15		X																COLLINA LIMESTONE: {MARBLE} – 1088' COARSELY RECRYSTALLIZED, LT ~ MOD GREY IN COLOR, SLIGHTLY CHLORITIZED LOCALLY "BLOOMS" – LOCAL TRACE FE-PYRITE. GIVING CORE A "MOTTLED" APPEARENCE.					
1095				15																			◄TRACE SPHARITE; 1~2% TOTAL SULFIDES.					
1100	100				20																							
1105				15																								
1110	100			15																								
1115					15																							
1120	100																											

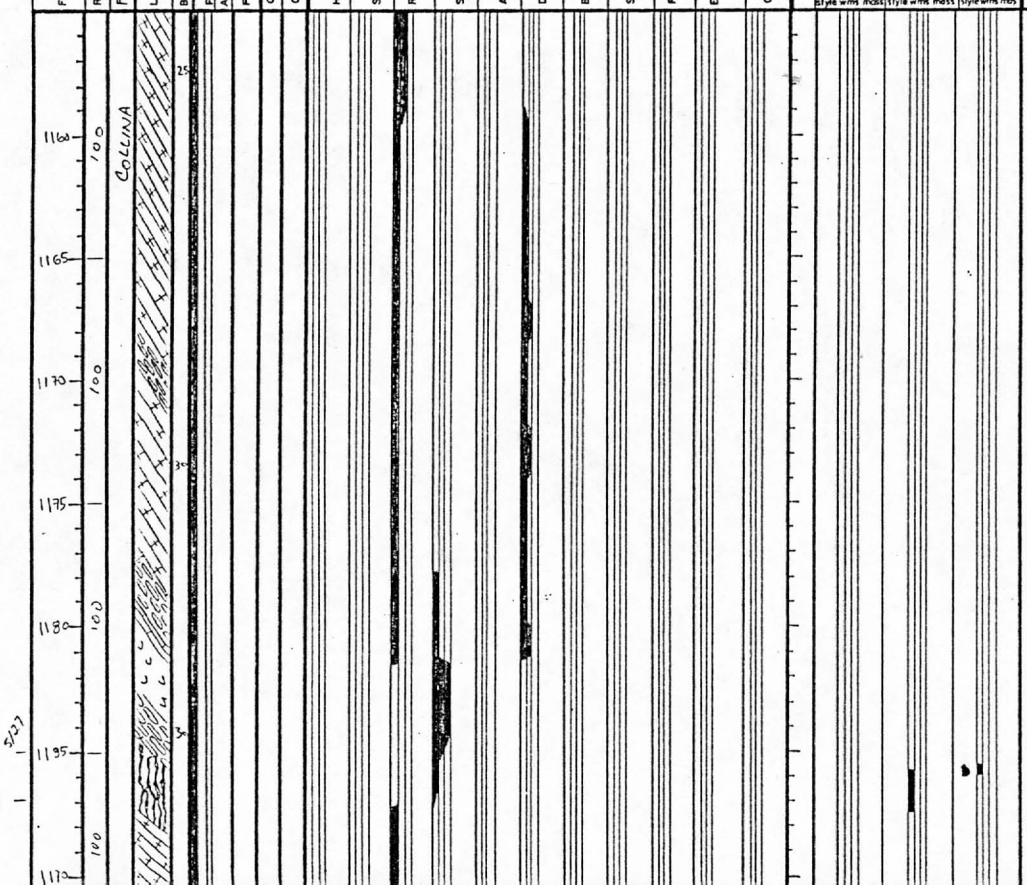
ASSAY DATA page: 32


DRILL HOLE: T-6
FOOTAGE
RECOVERY
FORMATION
LITHOLOGY
BEDDING ANGLE
FRACTURES ANGLES
FAULTS, SHEARS, ETC.
CALCITE VEINING
QUARTZ VEINING
HORNFELS
SKARN
RECRYSTALLIZATION
ALTERATION
SILICIFACATION
ARGILLATION
DOLOMITIZATION
BLEACHING
SANDING
Fe OXIDE
EPIDOTE + CHLORITE
OTHER
MINERALIZATION
PYRITE
MANGANESE OXIDE
GALENA-SPHALERITE
style wms mass
DESCRIPTION
ASSAY DATA
page: 33
Au
Ag
Cu
Pb
Zn
COLUMN
1125
1130
1135
1140
1145
1150
1155
COLUMN CONT. AS BEFORE:
REDUCED RECRYSTALLIZATION,
MORE PRESERVED FEATURES.
EPIDOTE "BLOOMS" - SOMEWHAT SEPTARIAN
IN APPEARENCE.
SOLUTION-COLAPSE BRECCIA.
CALCITE RHOMBS & VEIN FILLINGS.

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA~SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn

page: 34



Collina . CONT. AS BEFORE.

1187.7 LIMESTONE. BECOMES DOLOMITIC DOWN SECTION; MARBLIZED, STRONGLY RECRYSTALLIZED.

SILICA ~ SOLUTION BRECCIA

JASPEROID – SOLUTION BRECCIA W/ SILICA REPLACEMENT.

VUGGY, STRONGLY OXIDIZED ZONE, LARGE {1"} BLEB OF GALENA, MnOx ALONG WALLS OF VUGS. – Assay. 1185' ~ 1188'
– TRACE WULFENITE: BRIGHT YELLOW.

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1195	100	COLLINA			50																		COLLINA LS: WHITE MARBLE; COARSELY RECRYSTALLIZED. NO DISCERNABLE BEDDING.					
																							UVG ≈ 5.5" w/ V. CLEAR CALCITE RHOMBS, FOLLOWED BY SECONDARY SIDERITE. {1194.5 ~ 1195'}					
1200	100																						1197.4 ~ 1197.9' UVG; SAME AS ABOVE.					
					45																		1199 - 1199.4' UVG: SAME AS ABOVE.					
1205																												
1210	100				50																							
				?	50																							
1215																												
1220	100				65																							
				?																								
1225																												

page: 35

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1230	100	COLUNA LS.			50	/	//																COLUNA LS. {MARBLE} - SEE PREVIOUS DESCRIPTION.					
1235					45	/	/																					
1240	100																											
1245																												
1250	100						//																					
1255																												
1260	100				50	/	//																					

ASSAY DATA page: 36

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1265	100	COLLINA LS.																					COLLINA LS. SEE PREVIOUS DESCRIPTION.					
1270	100				45																							
1275				?																								
1280	100																						SHANY INTERVAL: HORNFELSED IN PART.					
1285					0																		DIAGENITIC PYRITE.					
					0																							
					5																							
1290	100			?																								
					30																							
1295	100																											

ASSAY DATA page: 37

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wrms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wrms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wrms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1300				?	20																		COLLINA LS: CONT. SEE PREVIOUS DESCRIPTION.					
1305					35, 30																							
1310				?																								
1315				?	35																							
1320					35																							
1325				?	60																							
1330																												

ASSAY DATA page: 38

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wrms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wrms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wrms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1335	100	COLLINA		7	30																		COLLINA LS. {MARBLE}, MOD-COARSELY RECRYSTALLIZED WHITE MARBLE. SWIRL LIKE TEXTURE COMMON THROUGH OUT (POSSIBLY REM. STYLOLITES). MARBLE IS LOCALLY GREY IN COLOR. LOCALLY DOLOMITIC-LS. IN PART. - NO DISCERNABLE BEDDING MINOR DISSEM. FE-PYRITE. V. MINOR FE OX STAINING ASSOC. W/ USINLCTS ETC.					
1340	100				45																							
1345	100																											
1350	100			7	35																							
1355	100																											
1360	100				35																							
1365	100																											

DRILL HOLE: 7-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFICATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1370	100	COLLINA		?	60																		COLLINA LIMESTONE: WHITE MARBLE, COARSELY RECRYSTALLIZED, MINOR HEMATITE ~ GOETHITE STAINING NO OTHER MINERALIZATION ~ CONTINUOUS THROUGHOUT; MINOR ARGILLATION THROUGHOUT.					
1375	100			?																								
1380	100																											
1385				?	65																							
1390	100																											
1395					56																							
1400	100			?																								

page: 40

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA (page: 41) Au	Ag	Cu	Pb	Zn
1405	100	COLLINA		?	25																		COLLINA : CONTINUED AS BEFORE. SEE PREVIOUS DESCRIPTION					
1410	100			?	50																							
1415																												
1420	100				60																							
1425				?	20																							
1430	100																											
1435					25																							

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
1440	100	COLLINA LS		?	30																		COLLINA LS: CONT AS BEFORE, SEE PREVIOUS DESCRIPTION.					
1445																							No MINERALIZATION					
1450	100			?	45																							
1455					30																							
1461	100			?																								
1465					0 5 25 30																							
1470	100																											

ASSAY DATA page: 42

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
1475	100	COLLINA		?	25																		COLLINA: CONT. SEE PREVIOUS DESCRIPTION: LITH. & TEXTURE UNCHANGED.					
1480	100			?	45																		QUARTZ FILLED VUG'S.					
1485				?																								
1490	100			?																								
1495				?	90																		SANDING: COMPLETE DESTRUCTION OF PREXISTING MARBLE & ITS TEXTURE ~ VERY CALCAREOUS ~ REACTS VERY STRONGLY TO HCl. REDDISH IN COLOR.					
1500	100			?	90																		VUGS					
1505					90																		COLLINA AS BEFORE.					

ASSAY DATA pages: 43

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1510	100	COLLINA LS		?	45																		COLLINA LS: MARBLE AS BEFORE.					
					50																							
				?	0																							
1515					0																							
					10																							
1520	100				45																		SILTSTONE: QUARTZ & SILT, RED IN COLOR BEDDING @ 35°					
				35																								
1525																												
		EARP FM																										
1530	100			?	50																							
1535				?																								
	100				70																							
1540				?																								

ASSAY DATA page: 44

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	FARP		?	35																		COLLINA: AS BEFORE, INCREASING VUGS.					
1545				35	35																		SILTSTONE: CALCAREOUS IN PART, RED IN COLOR, HEMATITE STAINED.					
1550	100				50																		COLLINA LS.					
1555	100			?																			VUGGY 1550 ~ 1555'					
																							1559 - 61'					
1560					45																							
1565	100			?																			SILTSTONE: AS ABOVE.					
1570	100			35	35																		LIMESTONE: AS ABOVE					
					35																							
1575	100			?	40																		VUGGY @ 1574'					

page: 45

DRILL HOLE:

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
	100																						LIMESTONE: MARBLE ~ MOD REX+/. V. WHITE IN COLOR, V. LITTLE MINERALIZATION; CALCITE VEINING; SHARP CONTACTS W/ SILTSTONE UNITS.					
				?	30																							
1580	100	FARP			35																							
	100																											
1585				?	60																							
					00																							
1590	100																											
					35																							
1595				?	40																							
	100																						SILTSTONE: SEE PREVIOUS DESCRIPTION.					
				55																								
1600																												
				55																			LIMESTONE: AS ABOVE.					
					60																							
1605	100			?																								
					00																		REDUCED TO NX @ 1609.					
1610	100																											

ASSAY DATA page: 46

DRILL HOLE: 4-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1615	100	EARP		1	35																		COLLINA LS: AS ABOVE.					
1620	100			1	50																							
1625	100			1	70 45																							
1630	100			1	35																							
1635				1																			THIN ARKOSIC UNIT: SAND SIZE QUARTZ, MAGNETITE, FSPAR ?, SED. ROCK FRAG'S. PINK IN COLOR. HEMATITE STAINED.					
1640	100			1	30																		LIMESTONE: AS ABOVE.					
1645	100			1	30																							

page: 47

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
		EARP																					COLLINA LS. CONT AS BEFORE. OCCASIONAL STYLOLITES.					
1650	100			7	35																							
				7	40																							
1655				7	45																							
1660	100			7	30																							
1665					45																							
1670	100			7	45																							
1675				7	50																							
1680	100																											

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	EARP		?	35		✓																COLLINA LS. AS BEFORE					
1685					40		✓																NO MINERALIZATION					
					40																							
1690	100																✓											
				?																								
1695					50																							
					40		✓																					
1700	100																✓											
				?																								
1705					70																							
					35																							
1710	100				40												✓											
				?																								
1715					40																							

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION
1720	100	EARP		?	35																		COLLINA LS. AS BEFORE.
				?	40																		
1725				?	60																		EARP Fm: CONTACT ~ DOLOSTONE/ SILTSTONE, LT GREY IN COLOR,
1730	100				60																		
1735	100				35																		
	1°				40																		CAVE SYSTEM
	V	OID																					LUCKY CUSS FAULT
1740	100	COLLINA LS.	SEMI MASS MNOx		40																		SEMI MASSIVE MNOx / COLLINA LS.
																							COLLINA LS. AS ABOVE. COARSELY XTLN MARBLE, WHITE IN COLOR.
1745	100				70																		
1750					40																		

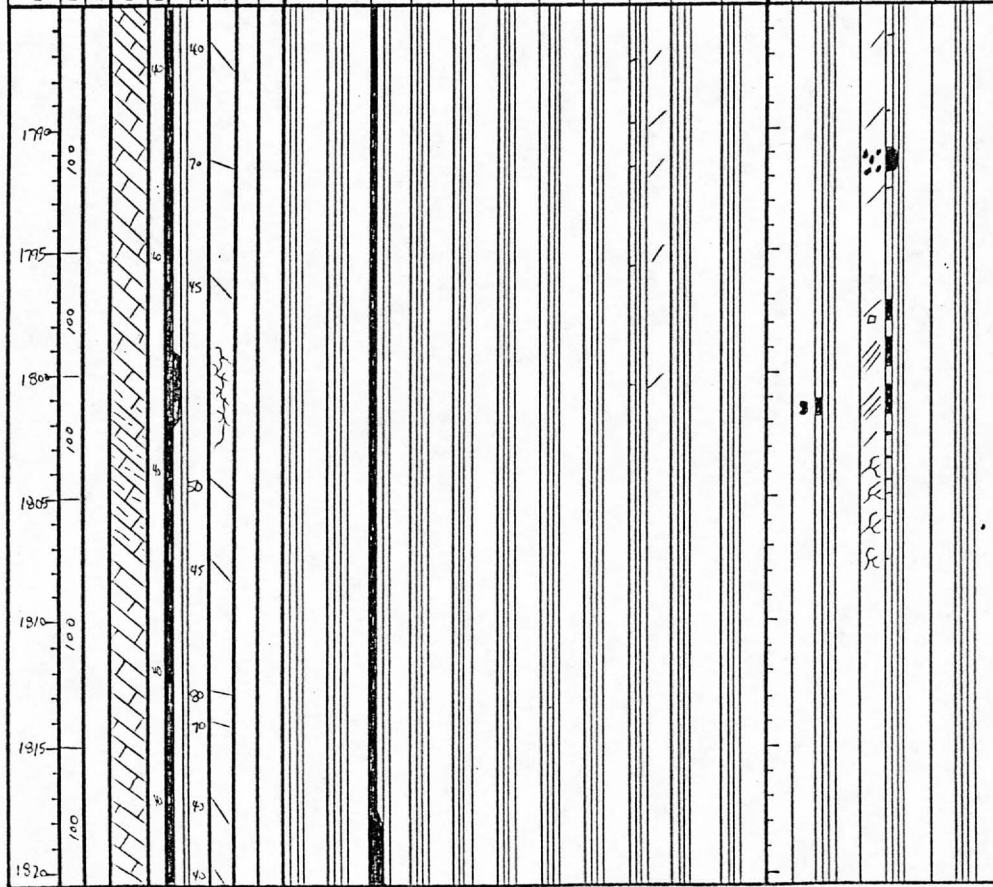
ASSAY DATA page: 50

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA (page: 50) Au	Ag	Cu	Pb	Zn
1755	100	COLLINA			35																		COLLINA LS AS PREVIOUS DESCRIPTION.					
					40																		EARP FM.					
		EARP		?																			FAULT [ALL GOUGE]					
					60																		DOLOMITIC LS; SILTY IN PART, GREY GREEN IN COLOR.					
1760	100			?																			SHALE - SILTSTONE: CALCAREOUS IN PART, FINELY BEDDED, BEDDING ∢° CLEARLY 40°; MINOR MnOx; GRADES INTO UNDERLYING LIMESTONE. FAULTS ALONG BEDDING PLANE					
				4	40																							
1765																												
				10																								
1770	100				40																		LIMESTONE; MASSIVE; LOCAL BEDDING (40°) W/ STYLOLITES; MnOx ASSOC. ROCK PINK IN COLOR (MnOx).					
1775				70	40																		LS CHANGES TO GREY IN COLOR, MnOx STILL PRESENT (BLACK, VEINLET CONTROLLED). FAULTS ALONG BEDDING PLANE.					
1780	100			10	40																							
1785																												

DRILL HOLE: T-6



DESCRIPTION

EARP FM: LIMESTONE; GREY IN COLOR, MASSIVE, STYLOLITES, LT. RECRYSTALLIZED; FAULTS, JOINTS, SLIPS ALONG BEDDING PLANE.

1789 ~ 1791' PYROLUCITE BLEBS.

SHATTERED ZONE. 1799' – 1802.5'

PYRITE BLEB.

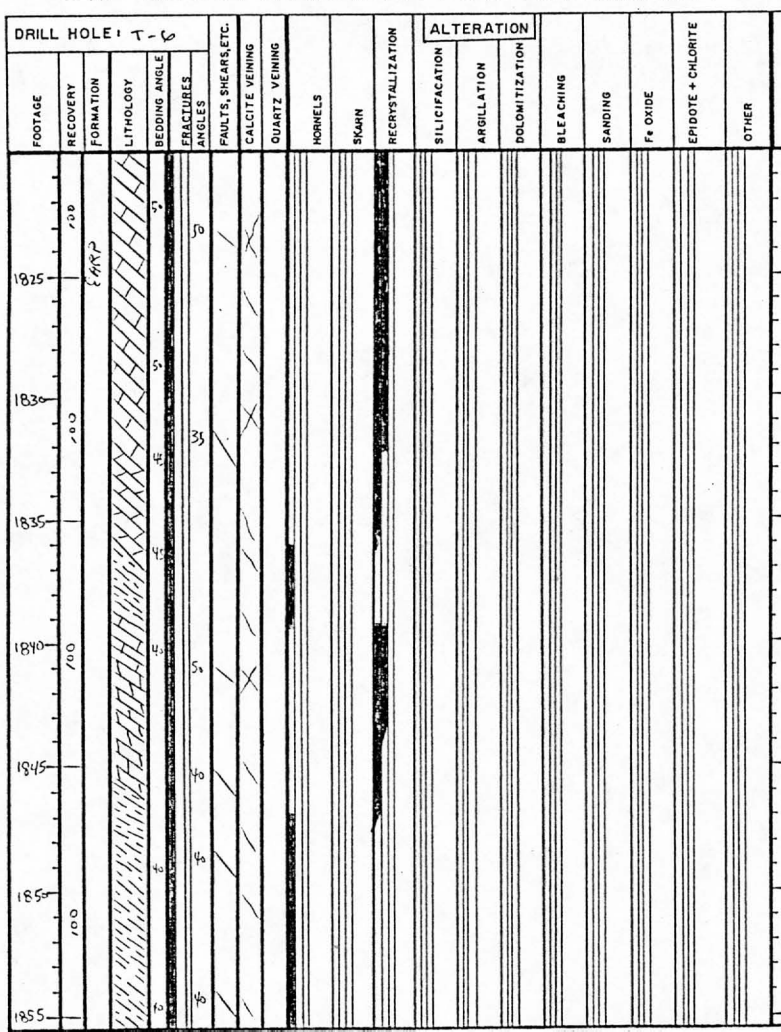
ROCK IS SILTY IN PART 1801' – 1806.5'

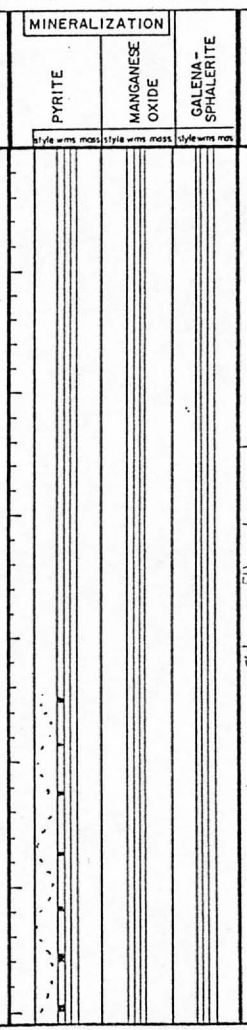
ASSAY DATA

page: 51

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-6





DESCRIPTION

EARP: LIMESTONE; COARSLY RECRYSTALLIZED, WHITE ~ GREY IN COLOR, LOCAL STYLOLITES;

DOLOSTONE: SIMILAR TO ABOVE LIMESTONE SUBUNIT.

SHALE: LT GREEN IN COLOR; FINELY BEDDED; HARD.

LIMESTONE } AS ABOVE

DOLOSTONE: AS ABOVE.

SHALE: AS ABOVE

ASSAY DATA

page: 52

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1860	100	EARP			55		X																EARP: LIMESTONE: AS BEFORE					
					50																							
1865																												
1870	100				45																		DOLOSTONE: AS BEFORE					
1875					50																							
1880	100						X																SHALE: AS BEFORE					
					30		X																					
1885					30		X																					
	100				25		X																LIMESTONE: AS BEFORE EXCEPT SILTY IN PART					
1890																												

page: 53

DRILL HOLE: T-6

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	PYRITE (style wms mass)	MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
1895	100	EARP			30																		EARP LIMESTONE: AS PREVIOUSLY DESCRIBED					
					45																		BLACKJACK-AMGERJACK VEINLET.					
1900	100				30																		T.D. 1900' 6/10/89					

ALTERATION

MINERALIZATION

ASSAY DATA

DIAMOND DRILL
HOLE T-8

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UJV 118
July 21, 1989
T-8 (230 TO 643.5)

SANTA FE PACIFIC MINING INC.
Attn: Mr. Duncan Riesmeyer
6200 Uptown Blvd., #400
Albuquerque, NM 87125

Analysis of 9 Drill Core Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	Ag (oz/t)	Cu (%)	Pb (%)	Zn (%)
1	T-8 230-235	.006	<.01	<.01	<.01	.01
2	T-8 235-238	<.002	<.01	<.01	<.01	<.01
3	T-8 403-405	.004	.01	<.01	<.01	.01
4	T-8 405-410	<.002	<.01	<.01	<.01	<.01
5	T-8 525-529	.002	.10	.01	<.01	.04
6	T-8 529-533	.006	.22	<.01	<.01	.10
7	T-8 632.5-635	.006	.10	.01	<.01	.02
8	T-8 635-640	<.002	<.01	.01	<.01	.02
9	T-8 640-643.5	<.002	<.01	<.01	<.01	.01

cc: Mr. Dale Armstrong

cc: Mr. Fred Jenkins

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA U.S.A.

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UJV 149
August 18, 1989
T-8 807-808.4 TO
T-8 1669-1671
PAGE 1 OF 1

SANTA FE PACIFIC MINING INC.
Attn: Mr. Duncan Riesmeyer
6200 Uptown Blvd., #400
Albuquerque, NM 87125

Analysis of 17 Drill Core Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	Ag (oz/t)	Cu (%)	Pb (%)	Zn (%)
1	T-8 706.3-707.3	<.002	.04	.01	<.01	.03
2	T-8 746.5-751.5	<.002	<.01	<.01	<.01	.03
3	T-8 807-808.4	<.002	<.01	<.01	<.01	.01
4	T-8 813.5-817	<.002	<.01	<.01	<.01	.01
5	T-8 1314-1319	<.002	<.01	<.01	<.01	.01
6	T-8 1319-1324	<.002	<.01	<.01	<.01	.01
7	T-8 1324-1327	<.002	<.01	.01	.06	.06
8	T-8 1390-1395	<.002	<.01	<.01	.02	.04
9	T-8 1476-1481	<.002	<.01	.01	.02	.01
10	T-8 1481-1486	<.002	<.01	<.01	.02	<.01
11	T-8 1486-1491	<.002	<.01	<.01	.03	.01
12	T-8 1643-1644	<.002	<.01	<.01	.02	.07
13	T-8 1646-1648.6	<.002	<.01	<.01	<.01	.02
14	T-8 1648.6-1651.6	.004	.64	.62	2.16	2.35
15	T-8 1651.6-1653.5	<.002	<.01	.01	.03	.03
16	T-8 1653.5-1658.5	<.002	<.01	.05	.02	.03
17	T-8 1669-1671	<.002	.02	<.01	.02	.03

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UJV 150
August 18, 1989
T-8 (2153 TO 2226)

SANTA FE PACIFIC MINING INC.
Attn: Mr. Duncan Riesmeyer
6200 Uptown Blvd., #400
Albuquerque, NM 87125

Analysis of 22 Drill Core Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	T-8 2153-2154	<.002	<.01
2	T-8 2154-2155	<.002	3.15
3	T-8 2155-2157	<.002	.59
4	T-8 2155-2158 **	.000**	.00**
5	T-8 2157-2158	.002	1.96
6	T-8 2158-2161.5	.002	.68
7	T-8 2161.5-2162.5	<.002	2.14
8	T-8 2161.5-2163.5 **	.000**	.00**
9	T-8 2162.5-2163.5	<.002	<.01
10	T-8 2163.5-2165	<.002	.30
11	T-8 2165-2167.5	.002	4.46
12	T-8 2167.5-2172.5	<.002	.33
13	T-8 2172.5-2177.5	<.002	.56
14	T-8 2177.5-2182	<.002	<.01
15	T-8 2182-2186	<.002	<.01
16	T-8 2186-2189.5	<.002	<.01
17	T-8 2189.5-2194.5	<.002	<.01
18	T-8 2194.5-2198.5	<.002	.10
19	T-8 2198.5-2199	<.002	10.29
20	T-8 2199-2202 *	.000*	.00*
21	T-8 2202-2205	<.002	<.01
22	T-8 2205-2209	<.002	<.01
23	T-8 2209-2211.5 *	.000*	.00*
24	T-8 2211.5-2216.5	<.002	<.01
25	T-8 2216.5-2219.5	<.002	<.01

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. UJV 150
August 18, 1989

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
26	T-8 2219.5-2224 *	.000*	.00*
27	T-8 2224-2226	<.002	<.01

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. UJV 150
August 18, 1989

ITEM	SAMPLE NUMBER	Cu (%)	Pb (%)	Zn (%)
1	T-8 2153-2154	.02	.06	.10
2	T-8 2154-2155	2.28	7.35	2.45
3	T-8 2155-2157	.68	2.62	3.05
4	T-8 2155-2158 **	.00**	.00**	.00**
5	T-8 2157-2158	1.33	5.90	4.25
6	T-8 2158-2161.5	.19	2.61	2.50
7	T-8 2161.5-2162.5	1.69	4.00	5.35
8	T-8 2161.5-2163.5 **	.00**	.00**	.00**
9	T-8 2162.5-2163.5	.01	.08	.18
10	T-8 2163.5-2165	.12	1.60	.77
11	T-8 2165-2167.5	1.43	13.00	6.10
12	T-8 2167.5-2172.5	.56	.73	1.87
13	T-8 2172.5-2177.5	.08	1.31	1.50
14	T-8 2177.5-2182	.02	.09	.55
15	T-8 2182-2186	.01	.02	.02
16	T-8 2186-2189.5	.02	.02	.05
17	T-8 2189.5-2194.5	.02	.20	1.05
18	T-8 2194.5-2198.5	.02	.68	2.53
19	T-8 2198.5-2199	.49	15.60	2.60
20	T-8 2199-2202 *	.00*	.00*	.00*
21	T-8 2202-2205	<.01	.04	.03
22	T-8 2205-2209	<.01	.16	.04
23	T-8 2209-2211.5 *	.00*	.00*	.00*
24	T-8 2211.5-2216.5	<.01	.01	.01
25	T-8 2216.5-2219.5	<.01	.20	.07

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. UJV 150
August 18, 1989

ITEM	SAMPLE NUMBER	Cu (%)	Pb (%)	Zn (%)
26	T-8 2219.5-2224 *	.00*	.00*	.00*
27	T-8 2224-2226	<.01	.11	.05

*NOTE: No sample submitted.

**NOTE: Sample not received.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA (page: 1) Au	Ag	Cu	Pb	Zn
5	No Recovery c Rock Bit	Alluvium																					Q_{AL} Alluvium: Valley Fill: Primarily Bisbee Seds. Other sediments incl. volcanics, unk. sed. rocks, minor ls. Clast angular - sub angular, mostly matrix supported. FeOx stained throughout.					
10																												
15																												
20	50%																											
25																												
30	100																											
35																												

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
40	100	QAL		?																			QAL					
	100																						ERROSIONAL CONTACT — BISBEE SEDIMENTS: SILTY SANDSTONE ~ SANDY SILTSTONE; BRICK RED IN COLOR, SEVIERLY SHATTER ROCK; JAROSITE ON FRACTURE FACES.					
45	100	BISBEE FM.		?																								
	100																											
50	100			?																								
55	100			?																								
60		NO RECOVERY ROCK BIT																					NO RECOVERY.					
65																												
70				?																								

page: 2

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
75	100	BISBEE FM.		1	0°																		BISBEE SEDIMENTS: CONT. AS BEFORE; SEVERLY FRACTURED.					
	100																						CALCITE - ARAGONITE VUG ~ LOST CIRCULATION. REGAINED W/ PAPER					
80	100			1																								
	100			1																								
85	100																											
	100			1																								
90	100			1																								
	100			1																			SANDSTONE LENS. ARKOSIC IN PART					
95	100																											
	75																											
100	50																											
105	66																											

TOO NUMEROUS TO ESTIMATE

page: 4

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
110	100	BASSE		?	SHATTERED																		BISBEE SEDIMENTS: SEVIERLY SHATTERED ROCK; PRIMARILY SANDY SILTSTONE; ARKOSIC IN PART, SANDY THROUGHOUT HEMATITE STAINED. — SOME FRACTURES ARE WIDE ENOUGH TO CARRY SURFACE WATER LADDEN W/ TERRIGENOUS MATERIAL {PRIMARILY SAND}.					
115	25			?																								
120	100																											
125	100			?																								
130	100			?																								
135	50			?	TOO NUMEROUS TO MEASURE																		MnOx DENDRITES					
140	100																											

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA page: 5 Au	Ag	Cu	Pb	Zn
145	50	BISBEE		7																			BISBEE SEDIMENTS: CONTINUED					
	100																						SHATTERED ROCK -					
	50			7																			POOR RECOVERY					
150	100																											
	66			7																								
155	75			7																								
	0%		NO RECOVERY																									
160	50																											
	0%		NO REC.																									
165	50			7																								
	100																											
170	0%		NO REC.																									
	25%			7																								
175	50%			7																								

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
180	25	BISBEE																					BISBEE SEDIMENTS CONTINUED. ROCK STILL SEVIERLY SHATTERED. - POOR RECOVERY.					
	100																											
	25																											
	100																											
185																							NO RECOVERY					
	0%		No Recovery																									
190																												
	100																											
195	100																						PYROLUSITE DENDRITES.					
	100																											
200	100																											
	100																											
205	100																											
	100																											
210	20																											

page: 6

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
215	100			?	λ	SHATTERED ZONE																	BISBEE SEDIMENTS: SEE PREVIOUS DESCRIPTION					
	25			?	NUMEROUS TO COUNT																							
	60																											
220	50			?																			◄ TRACE PYRITE					
	100																											
225	50																											
	50																											
	100			?																			LIMESTONE INTERBEDS. LIMESTONE; MASSIVE ~ TAN TO LT BROWN IN COLOR, WEAK ARGILLIC ALT.; NUMEROUS MnOx DENDRITE; TRACE PYRITE.					
230	50																											
	50																											
	100																											
235	100			?																								
	100																											
240	100			?																								
	80																											
245	60			?																								

ASSAY DATA page: 7

DRILL HOLE: T-B

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
250	45 / 70	BISBEE		1																			BISBEE SEDIMENTS: CONT. SEE PREVIOUS DESCRIPTION.					
255	100 / 100			1																								
260	100 / 100			1																								
265	66 / 70			1																								
270	50 / 50			1																								
275	150 / 100			1																			LIMESTONE: BEDDING @ 65° LIMESTONE/ DOLOSTONE; DK GREY IN COLOR. SLIGHTLY SANDY IN PART					
280	75 / 100			65																								

FRACTURES NUMEROUS TO CONT. SHATTERED ZONE

page: 8

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	PYRITE (style wms mass)	MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
285	100	STORE		55	20																Fe		LIMESTONE: CONT. AS BEFORE. DENDRITES THROUGHOUT.					
290	100			58	20																Fe		SILTY LIMESTONE; RED IN COLOR FeOxide; BEDDING @ 55° ~ 60°					
295	90			60																	Fe		LIMESTONE: AS ABOVE					
300	75																				Fe							
305	60			60																	Fe							
310	100			62	40																Fe							
315	100			60	45																Fe		SILTY LIMESTONE: AS ABOVE, LACKING IN FeOxides. GREY IN COLOR.					

page: 9

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	BLUFF FM.			38																							
320	100			6c	30																Fe							
					30																							
325	100			6c	30																Fe							
					35																							
330	100			6c	30																Fe							
335	100			6c	20																Fe							
																					Fe							
340					90																Fe							
	100																				Fe							
345																												
	100																											
350	100																											

DESCRIPTION

LIMESTONE ~ V. DARK GREY TO BLACK IN COLOR, WEAK SILICIFICATION; V. HARD; PARTIALLY DOLOMITIZED; JAROSITE STAINING IN VEINS MnOx DENDRITES THROUGHOUT.

LIMESTONE: BECOMING SILTY IN PART.

LIMESTONE - CLEANER.

ASSAY DATA

page: 10

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA (page: 11) Au	Ag	Cu	Pb	Zn
355	100	BISBEE FM.		?																			ARKOSIC SANDSTONE. SANDY FINE GRAINED, FSPARS, HEAVIES: MAGNETITE; FE OXIDES;					
	100																											
	100			?																								
360	100%			?																								
365	<10%			?																			SANDY-SILTSTONE: FINE GRAINED, ARGILLIC IN PART; FINE MnOx DENDRITES. SALMON IN COLOR.					
370	50%			?																								
	80																											
375	100			?																								
	75																											
380	0																											
	100			?																								
385	100			?																			SILTY LIMESTONES: DARK GREY IN COLOR, SLIGHTLY DOLOMITIC.					

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	10																						BISBEE SEDIMENTS: ALTERNATING LS. & SILTSTONE. SEE PREVIOUS					
	35																											
390	100																											
395	100																											
400	100																											
405	100																											
410	100																											
415	100																											
420	100																											

page: 12

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
425	100	BISBEE			45																		BISBEE SEDIMENTS: CONTINUED SEE PREVIOUS DESCRIPTION. - ALT SILTSTONES - CS.					
430	100				45																							
435	100																											
440	100																											
445	100																											
450	100				45																							
455	100																											

page: 13

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
460	100	BISBEE FM.																					BISBEE SEDIMENTS: CONT SEE PREVIOUS					
465	100																											
470	100																											
475	100																											
480	100																											
485	100																											
490	100																											

page: 14

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	PYRITE (style wms mass)	MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
495	100	BISBEE		45	40																		BISBEE ALT. SS - LS. - LIMESTONES ARE MORE COMPETENT THAN SS. - SILTSTONES, WHICH ARE SEVERLY FRACTURED & BROKEN. FeOx ON FACES. MINOR MnOx DENDRITES - SANDY SILTSTONE: FINE GRAINED SAND MIXED W/ SILT FeOx THROUGHOUT. MINOR MnOx DENDRITES.					
500	100				25																							
505	100																											
510	100																											
515	100																											
520	100																											
525	100																											

page: 15

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)
530	100	STOPE																				
535	100																					
540	100																					
545	100																					
550	75																					
555	70																					
560	100																					

DESCRIPTION

BISBEE CONTINUED. ALT. LS/SILTSN.

526-527' JASPEROID, POSSIBLE ASSOC. RHODENITE (?)

525-533' SEMIMASSIVE MnOx - PSILAMELANE

SANDY SILTSTONES ALTERNATING W/ SILTSTONES.

→ SS. SILTSTONE: RED IN COLOR FINE GRAINED, SAND SIZE GRAINS MnOx STOPS @ 535'

→ SILTSTONE: TAN IN COLOR, V. FINE GRAINED, DEMINISHED FeOxIDES.

ASSAY DATA

page: 16

Au	Ag	Cu	Pb	Zn

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
565	100	BISBEE		?	SHATTERED																		BISBEE SEDIMENTS: CONTINUED. SEE PREVIOUS DESCRIPTION.					
570	90																											
	100			?																								
575	100																											
580	100			?																								
585	100				SHATTERED																							
590	100			?																								
595	100																											

ASSAY DATA page: 17

DRILL HOLE: T-8

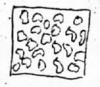
FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFICATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wrms mass)	MINERALIZATION: MANGANESE OXIDE (style wrms mass)	MINERALIZATION: GALENA-SPHALERITE (style wrms mass)	DESCRIPTION	ASSAY DATA (page 18): Au	Ag	Cu	Pb	Zn
600	100%	BISBEE																					BISBEE SEDIMENTS CONT. SANDY SILTSTONE: SEE PREVIOUS DESCRIPTION					
605	100																											
610	100																											
615	100																											
620	100																											
625	20%																											
630	0%																						BECOMING BRECCIATED {HEALED IN PART}					
	50																											

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFICATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
635	100				45																							
	75				50																							
	70				45																							
	100																											
640	75																											
	50				45																							
645	70																											
	100				20																							
650	70																											
	90																											
655	100																											
	75																											
660	100				SHATTERED																							
	100																											

BISBEE SEDIMENTS: CONT. AS BEFORE.

- CEMENT IS CALCITE ~ DOLOMITE. V. WEAK EFFERVESCENCE.



= HEALED BRECCIA ZONE; SILICA CEMENT

663' FAULT, BRECCIA ~ GOUGE w/ 3" CLAY SEAM AT BOTTOM
TOTAL FAULT THICKNESS ≈ 1.5'
UNKNOWN ANGLE & THROW

DRILL HOLE:

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
670	100	BISBEE FM.																					BISBEE SEDIMENTS CONT. AS BEFORE. LOTS OF REGROUND ROCK. AS WELL ROUNDED AS STREAM GRAVEL W/ MINOR MIXED CLAYS.					
675	75				45																							
680	100		REC.																									
685	60																											
690	75				20																		MINOR CONGLOMERATE SUB-UNIT. MINOR LS. W/ DENDRITES. NO RECOVERY					
695	100																											

ASSAY DATA

page: 20

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
705	100			?	45																		BISBEE SEDIMENTS CONT. ALT. SILTSTONES – LIMESTONES					
	100			?	50																							
					45																							
	100			?																			MANGANESE VEINLET					
	100			?																			LIMESTONE IS FOSSILIFEROUS {GRYPHEA, SP?}					
710	87			?	35																							
					40																							
	66			?	40																							
715					45																							
	100			?	70																		VEINLET @ 721' HAS SIDERITE INCRUSTING QUARTZ & CALCITE					
				?	50																							
720					45																							
	100			?																								
725	100			?																			SILICIFIED LS. WILL NOT EFFERVESCE. V. DARK GREY IN COLOR, V. FINE GRAINED.					
730	100			?																			LIMESTONE {SILICIFICATION STOPS} BECOMES SILTY IN PART. NO ARGILLATION.					
				?																								
735	100			?																								

page: 21

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
740	100	BISBEE		7	45																		BISBEE SEDIMENTS: CONTINUED, SEE PREVIOUS DESCRIPTION.					
					60																							
				7	60																							
745	100			7	75																							
					70																							
750	100			30	45																							
					40																							
755	100			30	35																							
				30	35																							
760	100				30																							
					30																							
765	100			30																								
					35																							
770																												

page: 22

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
775	100	BISBEE		35																			BISBEE SEDIMENTS: CONT. AS BEFORE.					
780	100			35																								
785	100			35																								
790	100			35																								
795	100			35																	E							
800	100			35																	E		MANGANESE DENDRITES 802.7' — MORQUILLA: SEE DESCRIPTION NEXT PAGE.					
805	100	MORQUILLA																			E							

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	SILICIFACATION	ARGILLATION	DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER FLUORITE	PYRITE (style wrns mass)	MANGANESE OXIDE (style wrns mass)	GALENA-SPHALERITE (style wrns mas)	DESCRIPTION	ASSAY DATA Au	Ag	Cu	Pb	Zn
												ALTERATION								MINERALIZATION				page: 24				
810	70	HORQUILLA		30	45																		HORQUILLA LIMESTONE.					
					45																		LIMESTONE – LT GREY IN COLOR, MINERALIZED (MnOx); LOCAL FLUORITE VEINING.					
					50																							
	100			35																								
					50																							
	95			35																			814 – 817' MASSIVE FLUORITE DEEP PURPLE TO DARK GREEN					
815																												
	100				35																		SILTSTONE INTERBED – RED IN COLOR.					
820				35																								
	100																						LIMESTONE – FOSSILIFERROUS BRACHIOPODS – SPIRIFER Sp? NUMEROUS STYLOLITES THROUGHOUT					
					60																							
825				35																								
	100				20																							
830				35																								
	100				45																							
835				35																								
	100				70																							
840	100			35	35																							

DRILL HOLE: T-8

page: 25

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFICATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
845	100	HORQUILLA		55	45																		HORQUILLA LIMESTONE: LT GREY TO PINK IN COLOR; STYLOLITES; LIGHTLY RECRYSTALLIZED; LOCALLY SILTY; MINOR MnOx DENDRITES THROUGH OUT.					
					40																							
	100				40																		LOCAL REDUCTION BLEBS.					
850																							LOCAL ALLOPHANE {BRIGHT GREEN} FRACTURE FILLINGS.					
	100			35	45																							
855					45																							
	100				60																							
860					65																							
	100			35																								
865					40																		FLUORITE VUG - VEIN.					
	100																											
870					35																		SILTSTONE INTERBED.					
	100			10																								
875																												

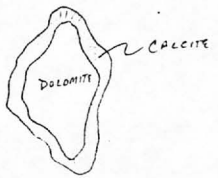
DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
880	100	HORQUILLA		40	45																K		HORQUILLA LIMESTONE: SEE PREVIOUS DESCRIPTION.					
	100				50																K		MANGANESE DENDRITES STOP —					
885																					K							
	100				40																							
890	100			40																			SILTSTONE INTERBED - RED IN COLOR, FINELY BEDDED; FINE GRAINED; SLIPS & JOINTS ARE CLAY COATED.					
	100				50																							
895	100				35																		LIMESTONE FAULT BRECCIA ≈ 20' THICK.					
900	100			?																			REDUCED TO NX @ 899' LIMESTONE: SOLUTION BRECCIA: MONOLITHIC, CLAST SUPPORTED w/ ROCK FLOUR GOUGE, NOT CALCITE CEMENTED (AT LEAST VISABLY)					
905	100			?	70																							
910																												

page: 26

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	GALENA-SPHALERITE (style wms mass)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
	100	HORDULLA		?	70	/																	LIMESTONE: WHITE - LT GREY IN COLOR; LOCAL REDUCTION BLEBS;					
915				?	45	/																						
				?	50	/																	CONTACT {END OF BRECCIA} @ 50°					
920	100																						Probably a self-healed tectonic breccia					
					50	/																	924' START OF SOLUTION BRECCIA WDR {COLLAPSE BRECCIA}					
925				?																			ROCK IS DOLOMITIC IN PART. FRAGMENTS THAT ARE DOLOMITIC ARE BEING REPLACED BY CALCITE.					
930	100				45	/																						
935					35	/																						
940	100			?																			MATRIX IS CALCITE w/ LOCAL CHLORITE AND MINOR HEMATITE STAINING.					
					40	/																						
945	90			?																								



ASSAY DATA

page: 27

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
950	100			?	35																		LIMESTONE: AS BEFORE COLLAPSE BRECCIA - MINOR PRESSURE SOLUTION.					
955				?																								
960	100			?	40																							
965																												
970	100			?																								
975					50																							
980	100			?																								

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style, wms, mass)	MINERALIZATION: MANGANESE OXIDE (style, wms, mass)	MINERALIZATION: GALENA-SPHALERITE (style, wms, mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
985	100			?	50																		LIMESTONE – CONTINUED AS BEFORE.					
				?																			ROCK QUALITY DATA > 90%					
990	100			?																								
995				?	15																							
1000	100			?																								
1005				?																								
1010	100			?	60																							
1015	100			?	45																							

ASSAY DATA page: 29

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA: Au	Ag	Cu	Pb	Zn
1020	100			?																			LIMESTONE - CONTINUED AS BEFORE, SEE PREVIOUS DESCRIPTION.					
1025																												
1030	100			?																								
1035																												
1040	100			?	50	12/																	FAULT @ 50°					
1045																												
1050	100			?	55	12/																	FAULT @ 55°					

ASSAY DATA page: 30

DRILL HOLE: T-8

FOOTAGE	RECOVERY	FORMATION	LITHOLOGY	BEDDING ANGLE	FRACTURES ANGLES	FAULTS, SHEARS, ETC.	CALCITE VEINING	QUARTZ VEINING	HORNFELS	SKARN	RECRYSTALLIZATION	ALTERATION: SILICIFACATION	ALTERATION: ARGILLATION	ALTERATION: DOLOMITIZATION	BLEACHING	SANDING	Fe OXIDE	EPIDOTE + CHLORITE	OTHER	MINERALIZATION: PYRITE (style wms mass)	MINERALIZATION: MANGANESE OXIDE (style wms mass)	MINERALIZATION: GALENA-SPHALERITE (style wms mas)	DESCRIPTION	ASSAY DATA (page: 31) Au	Ag	Cu	Pb	Zn
	100			?	30																		LIMESTONE - CONT. AS BEFORE. SEE PREVIOUS DESCRIPTION					
1055				?																								
				?	35																							
1050	100			?																								
1065					40																							
1070	100			?																								
1075					65																							
1080	100																											
				?	45																		FAULT @ 45°					
1085	100																											