CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

NYAZ — HMCC

New info on old copper property now controlled by

Elam Burkhardt
dba Sierra Colorado Minas
7021 E. 2nd St
Tucson AZ

I have several people who may be interested in this property

2

798-1744

Needs Land status.

Good Ox potential
Limited drilling
needs work!

GEOLOGY OF THE
DURHAM HILLS,
PINAL COUNTY, ARIZONA

By

Jonathan D. Shenk
Consulting Geologist
P.O. Box 1509
Oracle, Arizona 85623

For

Chuck Gaston
Chief Engineer
Planning and Corporate Development
Magma Copper Company
7400 N. Oracle Rd, Suite 200
Tucson, Arizona 85704

October 1993

GEOLOGY OF THE DURHAM HILLS, PINAL COUNTY, ARIZONA

By Jonathan D. Shenk

SUMMARY

* Detachment-fault related CuOx deposit

    - Range mapped at 1"=500', selected mineralized areas mapped at 1"=50'

* Two structural blocks: western block and eastern block

* Two areas of mineralization: Blue Copper Mine and Cross Triangle

* Cross Triangle -

    - Strike length: 3000'

    - Thickness: 50'- 75' (assumed additional low-grade target increases width to 150')

    - Down dip depth (projected): 250'- 750', average 500'

    - Total Cu grade varies from 0.04% to 0.69%
      Acid sol Cu grade varies from 0.01% to 0.61%

    - Inferred + target resources
      <u>18.2 mill s.t. @ 0.34% total Cu</u>

    - Inferred + target + extended target resources
      <u>21.3 mill s.t. @ 0.32% total Cu</u>

* Blue Copper Mine -

    - Strike length: 250' (assumed N and S extension increases length to 3250')

    - Thickness: 400' (assumed additional low-grade target increases width to 850')

    - Down dip depth (projected): 500'

    - Total Cu grade varies from 0.09% to 1.82%
      Acid sol Cu grade varies from 0.07% to 1.61%
      Local Cn sol Cu grades of 0.10% and 0.21%

SUMMARY (cont.)

* Blue Copper Mine (cont) -

- Inferred + target resources
  <u>7.0 mill s.t. @ 0.48% total Cu</u>

- Inferred + target + extended target resources
  <u>43.8 mill s.t. @ 0.47% total Cu</u>

* Total Durham Hills Resource

- Inferred + target resources
  <u>25.1 mill s.t. @ 0.38% total Cu</u>

- Inferred + target + extended target resources
  <u>62 mill s.t. @ 0.43% total Cu</u>

INTRODUCTION

Purpose

As the result of a reconnaissance study by More (1992), Chuck Gaston, Planning and Corporate Development Chief Engineer, Magma Copper Company, requested the author to produce a geologic map of the Durham Hills. The purpose of the project was to further define the known CuOx occurrences in the area and to better target possible covered extensions. The mapping progressed in four stages: 1) regional reconnaissance of the Durham Hills - late July, 2) mapping of a large portion of the Durham Hills at 1" = 500' - mid-August to late September (Plate 1), 3) detailed mapping and rock chip sampling of selected areas at 1" = 50' - late September to early October (Plates 2 - 5), and 4) report preparation - mid- to late October.

Location

The Durham Hills are located approximately 30 mi NW of Tucson, Pinal County, Arizona (see map in More 1992). Two main CuOx deposits are hosted in two structural blocks, a west block and an east block, separated by a NW-trending high-angle normal fault (figs. 1 and 2). More (1992) referred to the two deposits as the Cross Triangle Ranch deposit, located in the western block, and the Magma Well deposit, located in the eastern block. He also referred to the high-angle normal fault as the Wash Fault. The Magma Well deposit has also been referred to as the Edwards Mine, the Owen Mine and more regularly as the Blue Copper Mine. In this report, the name Blue Copper will be used.

The Cross Triangle deposit is located in a series of NW to NS trending, low-lying hills, informally referred to by the owners as, from north to south, Rattlesnake Hill, Green Hill, and Blue Hill. The Cross Triangle has been heavily prospected by trenches and pits, and minor amounts of CuOx-stained building stone have been shipped. The Blue Copper mine is located approximately 3/4 of a mile NE of the Cross Triangle and consists of a heavily prospected, low-lying hill adjacent to a cattle tank with several surrounding small prospect pits. Building stone has also reportedly been shipped from this deposit.

A third area of CuOx mineralization occurs approximately 1/2 mile to 1 mile south of the Cross Triangle deposit in two different geologic zones: 1) a mineralized NW-trending shear zone (microdiorite area of More [1992]) and 2) the southern extension of the Cross Triangle deposit at the contact between foliated quartz monzonite and mylonitic schist. These two zones are only moderately prospected.

Figure 1 - View of Cross Triangle prospect, looking south. Workings in center of picture are S. Green Hill right center and N. Blue Hill left center. Rattlesnake Hill is low lying hill at center far right (north), roof of water tank is visible to the left (south) of N. Blue Hill workings.

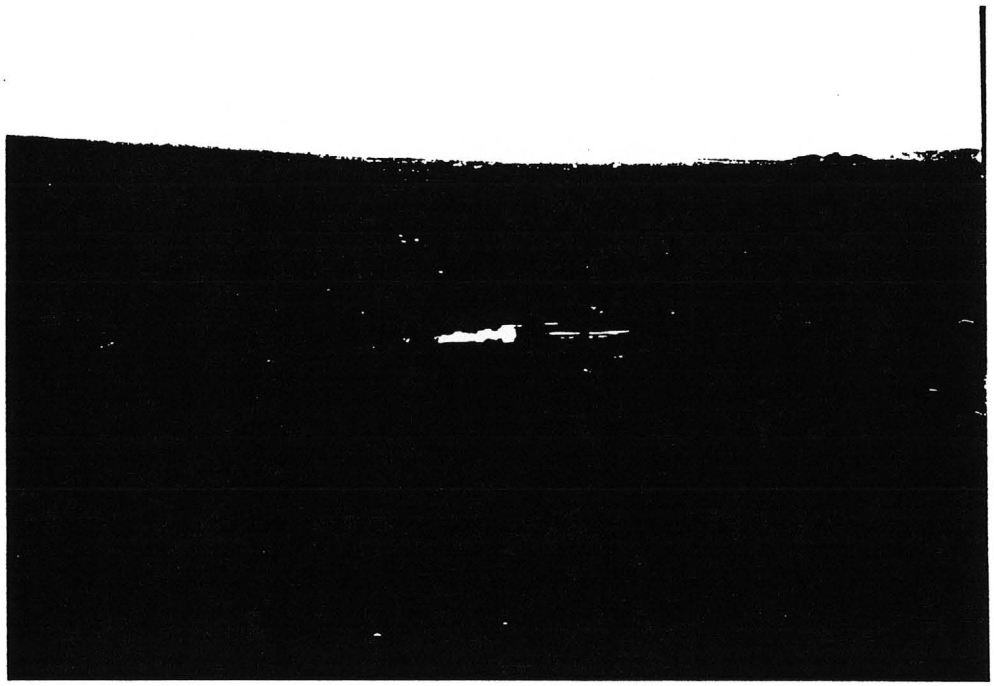


Figure 2 - View of Blue Copper mine and
cattle tank, looking southeast.

Ownership

Land ownership is a mix of private, state, and federal, and the reader is referred to the land map in the Magma files for further details. In general, the mineral and surface rights at the Blue Copper mine are owned by Joe Goff, a local rancher, with mineral rights in the far northern extension controlled by Glynn Burkhardt. The mineral rights at Cross Triangle are controlled by Glynn Burkhardt through unpatented mining claims, and the surface rights at Cross Triangle are owned by Goff and the BLM. Additional surrounding land is controlled by the state.

Recent History

Pre-1960s, the Durham Hills were examined and worked intermittently by several companies and individuals (DMMR, 1943, Fowells, 1948). Some holes were apparently drilled during this period, one of which was drilled by Magma Copper in 1950 and is shown on the topographic map as Magma Well. The drill log for this early Magma hole is reportedly not at San Manuel but might be available in Newmont's files.

In the 1960s and early 1970s, the area north of the Tortolita Mountains was the focus of intense exploration by several companies, including most importantly for this report Kerr McGee and Cities Service. The geology of the region was, for the most part, based on a M.S. thesis by Barter (1962).

Kerr-McGee reportedly drilled several holes in and around the Blue Copper Mine. Reports vary from 30 to 160 holes, and from shallow, 50 ft deep to 1000 ft deep. A submittal to Cities Service by John M. Johnson in 1977, with an accompanying report by Hanks (1968), is probably the best source of available information on the Kerr McGee holes because the Hanks report was written soon after the time of the drilling. Hanks states that Kerr McGee drilled "...nearly 40 shallow holes extending into the alluvium covered area northeast of the mine. The holes averaged only about 50 feet in depth and carried values ranging from slightly over trace amounts to nearly 1.5% copper." The average depth of 50 feet is suspect because of Kerr McGee's willingness to drill much deeper holes (e.g. Red Mountain) but the number of holes (40) seems reasonable.

Cities Service Mineral Corporation (1973) flew an aeromagnetic geophysical survey of most of the Tortolita 15' quadrangle searching for magnetic lows, known to be associated with nearby porphyry copper deposits. Cities targeted the Huerfanito Copper Deposit roughly 10 miles SW of the Durham Hills and 3 miles east of Desert Peak and they drilled one unsuccessful hole. Their geophysical survey, however, covered the Durham Hills and generalized structural interpretations can be made from their data. The results of this early work by Kerr McGee, Cities Service, and other companies did not result in a major discovery of sulfide porphyry copper deposits.

The mid to late 1970s saw a flurry of activity in the area from the academic community, including work by Budden (1975), Banks and others (1977), Banks (1980), Keith and others (1980), and Rehrig and Reynolds (1980). From this work developed the idea of low-angle detachment faults associated with the Rincon-Santa Catalina-Tortolita metamorphic core complex.

The 1980s saw a lull in activity in the area. Of regional importance, however, was the work being carried out in western Arizona on detachment faults by the Arizona Geological Survey, and the development of a detachment fault related mineral deposit model by Wilkins and others (1986). Dickinson (1987) compiled several 15 minutes geological maps of the Catalina Mtns and San Pedro Valley, including the Tortolita 15' quadrangle, which eventually resulted in an overall synthesis of the region in Dickinson (1991). The detachment fault-related mineral deposit model and related grade-tonnage models are currently being further refined by the U.S. Geological Survey (Long, 1992 and 1993)

GEOLOGY OF THE DURHAM HILLS

Rock Units

Granodiorite - [Map symbol: gd]
Sheared granodiorite - [Map symbol: (gd)]

Two large outcrops of granodiorite occur at the extreme northern and southern ends of the Durham Hills. The southern outcrop is relatively undeformed, with local highly sheared and lineated rocks occurring in fault blocks. Foliation is not readily visible in these blocks. In the northern range, the granodiorite is slightly to moderately foliated. The nature of the contact with the quartz monzonite (see description of qm below) is at present unclear. Xenoliths of possible granodiorite (fig. 3) plus aligned K-spars subparallel to the contact in the quartz monzonite (fig. 4) suggest that the quartz monzonite is intrusive into the granodiorite (as mapped by Banks and others, 1977 and as locally mapped during this project). Chilled margins and sharp, dike-like contacts of granodiorite with quartz monzonite, however, strongly suggest that the granodiorite intruded the quartz monzonite (mapping for this project and reconnaissance field work accompanied by Don Hammer). In addition, numerous, fine-grained, younger mafic dikes (see description below) cut the Durham Hills which, where thick enough, can appear as larger granodioritic intrusive bodies (or vice-a-versa). Regionally, Yeend (1976) recognized a mid-Tertiary granodiorite intrusive into granitic gneiss and schist in the Picacho Mountains and an older Laramide diorite, and Keith and others (1980), working in the Catalina and Tortolita Mountains, interpreted the mid-Tertiary Catalina Quartz Monzonite as intrusive into the Leatherwood equivalent Laramide Chirreon Wash Granodiorite. The probable explanation in the Durham Hills is that both an older Laramide and a younger mid-Tertiary granodioritic intrusive occur, the details of which remain to be worked out.

Quartz monzonite - [Map symbol: qm]
Sheared quartz monzonite - [Map symbol: (qm)]
Sheared and mineralized quartz monzonite - [Map symbol: (qm)']

The dominant rock type in the Durham Hills is a quartz monzonite very similar in appearance to Precambrian Oracle Granite, with K-spar phenocrysts up to 1/2" in length and abundant xenoliths. Earlier workers (e.g. Barter, 1962) mapped the qm as Precambrian, but Banks and others (1977), eventually correlated the qm with the mid-Tertiary Catalina Quartz Monzonite in the Tortolita Mountains. In the western structural block, the qm varies gradationally west to east from structurally low, generally undeformed but locally foliated quartz monzonite [qm], through moderately to highly foliated and lineated, locally brecciated and mineralized quartz monzonite [(qm) and (qm)'], to the structurally high mylonitic schist (see description below). A similar structural sequence is repeated in the eastern structural block. The highly silicified quartz monzonite [(qm)'] is host to the two main CuOx deposits and occurs at the contact between (qm) and mylonite at Cross Triangle. This contact, however, is not exposed at the Blue Copper mine.

Mylonitic schist - [Map symbol: myl]

Mylonitic schist outcrops in a 0' to 800' wide band trending roughly NS from Rattlesnake Hill to just south of Durham Wash (fig. 5). The schist is typically highly foliated and lineated, with strikes varying from slightly NE to NW. It is also highly variable in composition, appearing to have been derived both from quartz monzonite in the structurally lower portions and from granodiorite in the structurally higher portions. In fact, zones of (qm) can be found structurally interlayered with mylonitic rock in an approximately 500' section in Durham Wash just N of the intersection with Suffering Wash, and rocks mapped as schist on Rattlesnake and N. Green Hill appear very much like sheared granodiorite. The mylonitic schist is interpreted as being formed by detachment fault processes, with the faulting localized along the contact between qm and gd.

Aplite dikes - [Map symbol: ap]

Aplite dikes and associated pegmatites and massive quartz veins typically intrude the structurally lower portions of the quartz monzonite and trend N to NW and dip SW (fig. 6). Smaller outcrops of aplite dikes are also found in the structurally higher (qm), where they generally strike NE to EW to SW with variable dips. Locally the aplite dikes are sheared, but this may have resulted more during emplacement rather than from detachment fault processes.

Mafic dikes - [Map symbol: md
Sheared mafic dikes - [Map symbol: (md)]

Mafic dikes also intrude the quartz monzonite and vary in composition from porphyritic diorite and microdiorite, to andesite. The mafic dikes appear to be the youngest intrusive in the region, as evidenced by a md cutting ap in the low lying ridge just east of Rattlesnake Hill. Often a mafic dike will take advantage of the same open structure, typically a joint, along which an aplite dike has intruded. Intrusion of the mafic dikes appears to occur equally at all structural levels, with one sheared and mineralized dike(?) appearing to be intruded along the possible detachment fault contact between mylonite and Tertiary Cloudburst (see discussion below) in the E Cen1/2, sec 19. As discussed above, the sheared mafic dikes are easily confused with sheared granodiorite, and it is not certain that this outcrop is indeed a dike. Numerous mafic dikes are also found in the western structural block striking SW from a central granodioritic "plug" in the SW1/4 sec 19 (microdioritic dike swarm of More, 1992). Because of time constraints, this "plug" was not mapped in detail. It is interesting to note, however, that this "plug" is in roughly the same structural position as the large mafic "dike" located in the eastern structural block in the E Cenl/2 of sec 20. Mineralization was not found directly associated with the mafic dike swarm, however, the moderately mineralized, NW-trending shear zone just north of the swarm and the mineralized "dike" located along the possible detachment fault suggests that the CuOx mineralization is associated with the dikes.

Tertiary Cloudburst
Cloudburst volcanics - [Map symbol: Tcv]
Cloudburst sediments - [Map symbol: Tcs]
Cloudburst sediments/landslide - [Map symbol: Tcsl]

A wedge shaped, structurally bounded sedimentary package of vesicular andesitic volcanics (Tcv) and granite cobble conglomerates (Tcs), located in the E Cenl/2 sec.19, is correlated with the Tertiary Cloudburst Fm based on its lithology and similar brownish red weathering characteristics. During mapping, it was difficult to locate surfaces on which to obtain a strike and dip, however, an overall impression of the orientation (admittedly suspect without data) is that the sediments are striking N45W and dipping near vertical to overturned. A triangular shaped outcrop of granitic material has been mapped in the Cloudburst and is correlated with the Precambrian Oracle Granite. The upper contact of the granite with the volcanics appears highly weathered, and large cobbles of granite can be found both in the lower portions of the andesite and in the laterally adjacent Cloudburst sediments (fig. 7). This block is tentatively interpreted as a landslide block (Tcsl) in the Cloudburst sedimentary package, a relationship regionally not at all uncommon for this formation (see Dickinson, 1991).

Tertiary San Manuel Fm equivalent - [Map symbol: Tsm]

Lt gray, conglomeratic, flat-lying to gently dipping, sediments outcrop at several localities in the area, but are best viewed SE of Durham Wash near the Cross Triangle Ranch.

Quaternary Older Alluvium - [Map symbol: Qoa]

Recent to older sediments located along the banks of washes and locally forming pediment surfaces.

Quaternary Alluvium - [Map symbol: Qal]

Recent wash sediments.

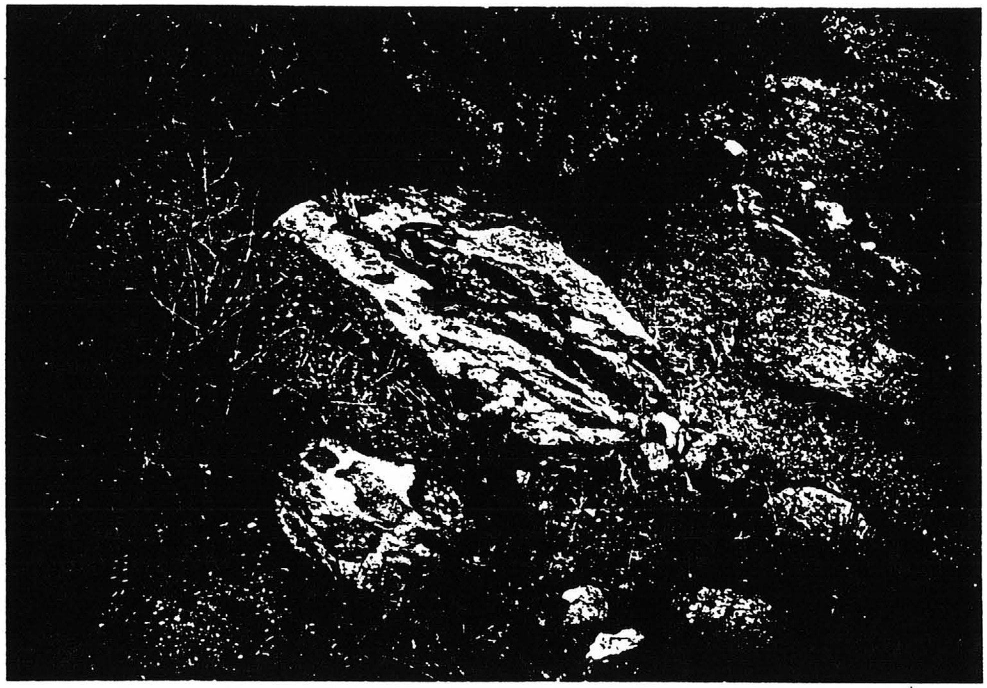


Figure 3 - Outcrop of quartz monzonite with abundant granodioritic(?) xenoliths near contact with granodiorite. Evidence of younger qm and older gd.

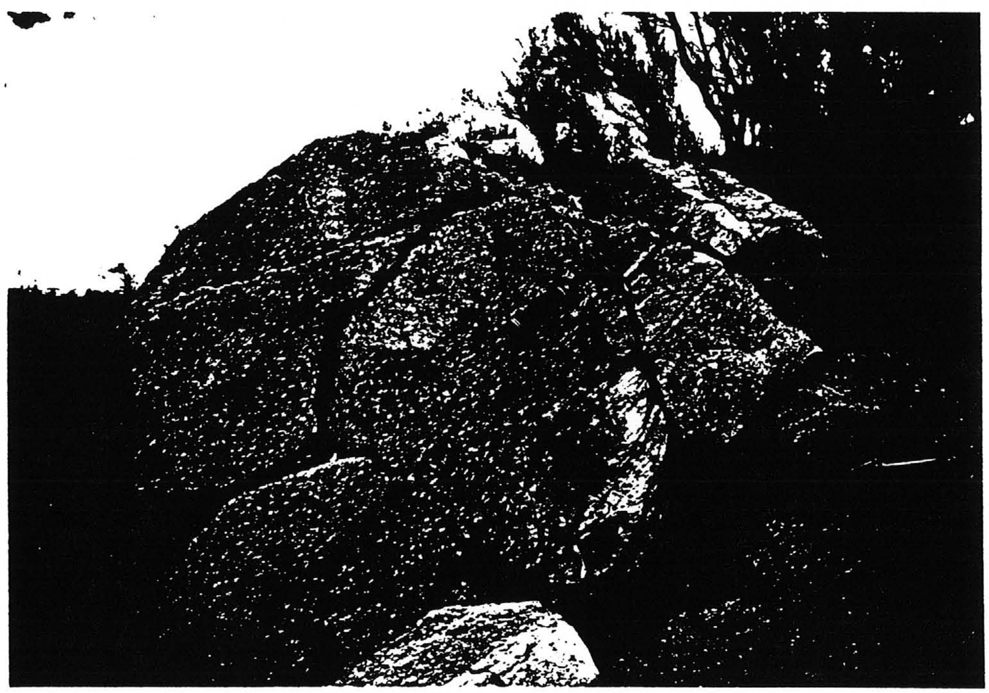


Figure 4 - Flow alignment of K-spar phenocrysts subparallel to mild foliation fabric in (qm). N. Durham Hills, looking south.

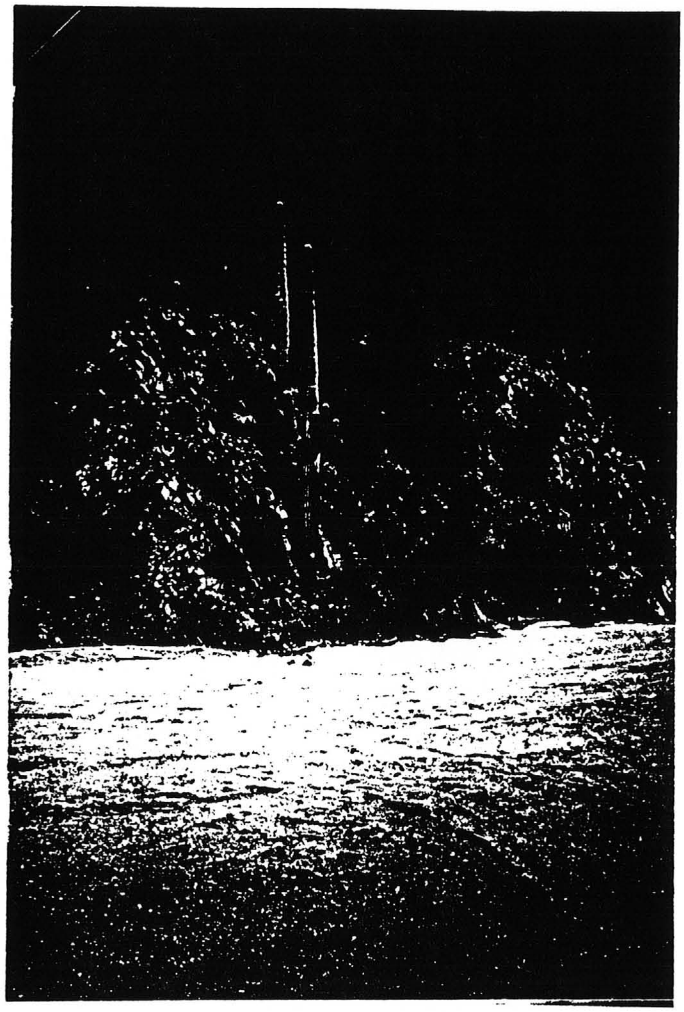


Figure 5 - Outcrop of mylonitic schist is Durham Wash. Facing north.

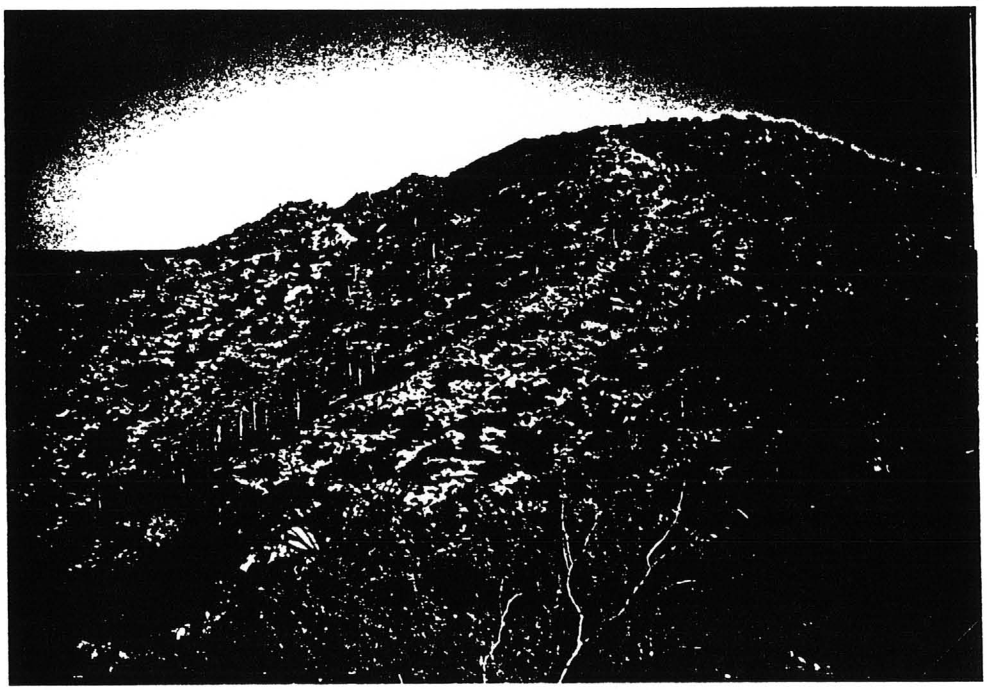


Figure 6 - Aplite dike on ridge cutting quartz monzonite, western structural block. Looking south.

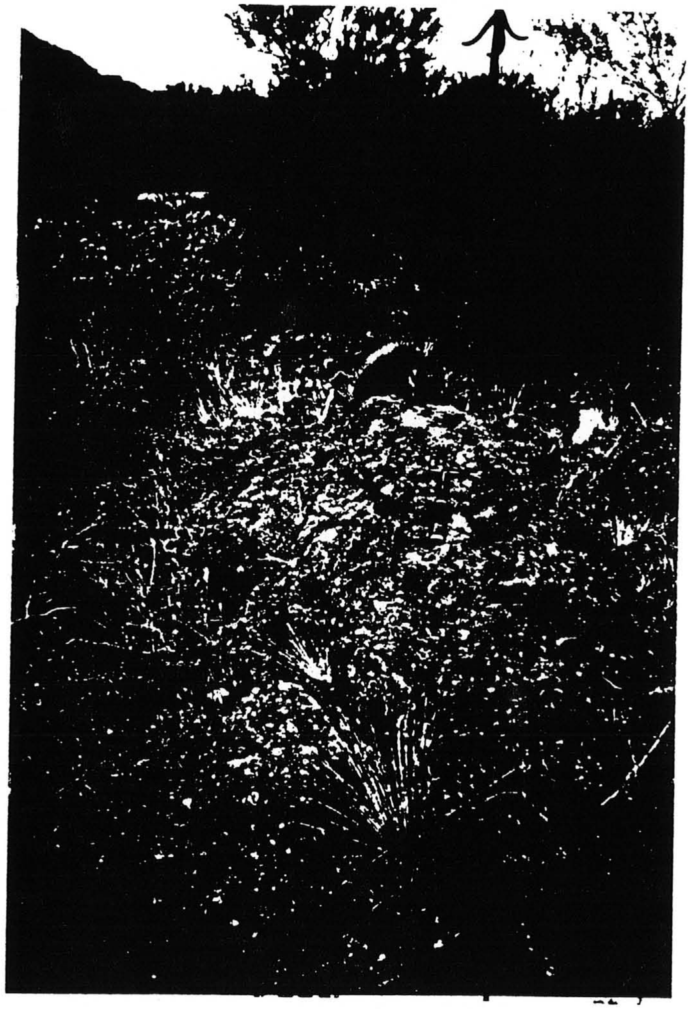


Figure 7 - Outcrop of basal Tertiary andesitic volcanics above contact with Precambrian Oracle Granite below. Conglomeratic clasts of granite caught up in overlying volcanics interpreted as sedimentary contact.

Structural Geology

Foliation and lineation in the quartz monzonite and mylonitic schist is highly suggestive of detachment fault processes (fig. 8). The overall strike and dip of the foliation and lineation would seem to suggest a top to the NE extension. However, preliminary analysis of possible shear indicators in the mylonite (stretched and rotated quartz grains) suggests top to the SW extension, which is consistent with the regional sense of shear in the Catalina-Tortolita metamorphic core complex. This geometry indicates that the rocks in the Durham Hills have been rotated and back-tilted along high-angle, listric normal faults.

While the regional geology is highly suggestive of a low-angle detachment fault occurring in the Durham Hills (see Dickinson, 1991), actually locating the trace of a detachment surface is difficult. The most likely candidate, the fault contact between the sheared mafic dike(?) and Tertiary Cloudburst in the eastern portion of the western structural block, does not appear as a typical detachment surface (very flat and smooth with microbreccia). This lack of a clear detachment fault is interpreted as either: 1) the surface was obliterated during listric faulting and back-tilting of the Durham Hills, or 2) the outcrop of Cloudburst is simply a wedge caught up in the high angle normal faulting and is not related to the detachment fault process. At this time, the first alternative is preferred. In the eastern structural block, the contact between foliated quartz monzonite and mylonitic schist, if it exists, does not outcrop. An examination of the aeromagnetic map of Cities Service shows a magnetic low striking N to NW immediately east of the N. Durham Hills. East of this low is a shallow magnetic high. This is suggestive of a detachment fault (low) with Tertiary Cloudburst volcanics of the east side (high). Alternatively, the low can also be interpreted as a second high-angle listric normal or a NS shear zone (see discussion below).

In addition to the highly foliated and lineated mylonitic rocks, zones of sheared rocks, possibly associated with strike-slip motion, cross-cut or trend subparallel to the mylonitic fabric and therefore appear to post-date the formation of mylonite. This shearing might be related to the later high angle listric normal faulting, or it could be a secondary fabric within the mylonitic fabric. Locations where this shearing are visible include: 1) north-trending, subparallel shear on the west slope of S. Blue Hill and N. Green Hill, 2) north-trending, subparallel sheared mafic dike(?) on the east slope of Blue Hill, and 3) the cross-cutting, N45W mineralized shear zone subparallel with the mafic dike swarm and Durham Wash. Dips on the shear zones are difficult to ascertain with certainty in the field, but the north-trending zones appear to be dipping near vertical, while the N45W zone appears to be dipping roughly 45 degrees to the southwest.

A major high-angle normal fault, probably listric, trending N20W and dipping roughly 80SW, offsets the Durham Hills into a western structural block and an eastern structural block (Wash Fault of More, 1992). Direct evidence of this fault in the form of a fault plane where one can place a compass was not found, but the indirect evidence of a regional fault is clear from 1) several subparallel subsidiary faults (fig. 9), 2) Tertiary Cloudburst sediments in direct contact with quartz monzonite but no qm clasts in the sediments (i.e. fault contact vs sedimentary contact), and 3) overall repeated sequence of lithologies on either side of the fault

Minor structures include 1) numerous joints, often occurring perpendicular to foliation or striking NE through hill top saddles, 2) breccia zones with earthy hematitic cement, possibly associated with intrusion of mafic dikes, 3) several NE trending fault zones, offsetting the northern portion of the Cross Triangle deposit, 4) several N-trending faults subparallel to the foliation fabric, and 5) geomorphic expressions of regional faults on the western slopes of the Durham Hills (fig. 10).

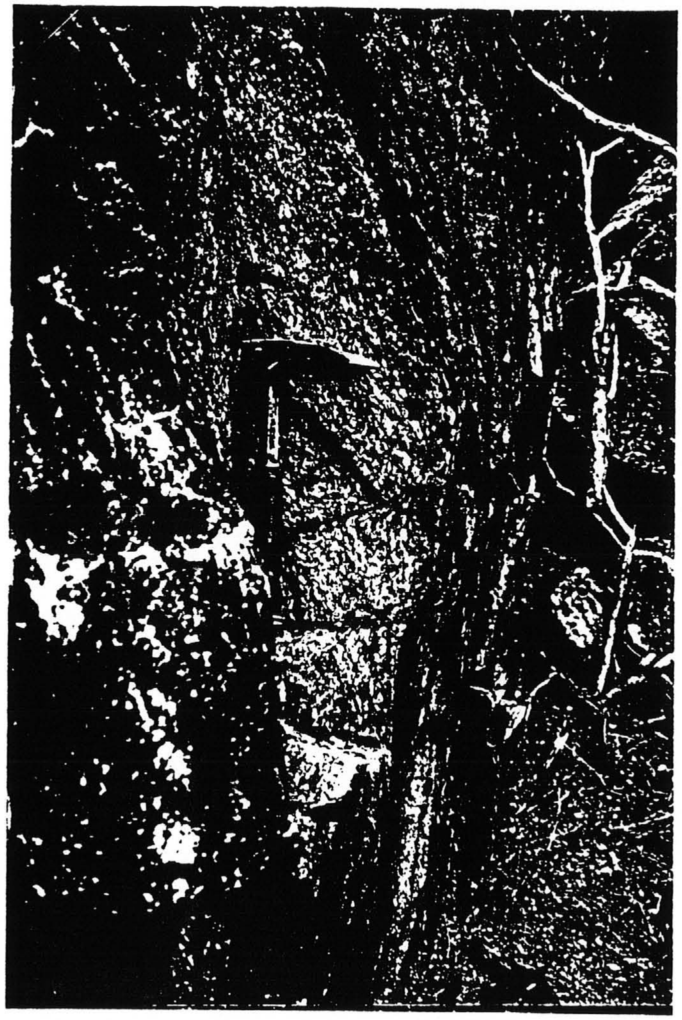


Figure 8 - Transition from highly sheared quartz monzonite to mylonitic schist.

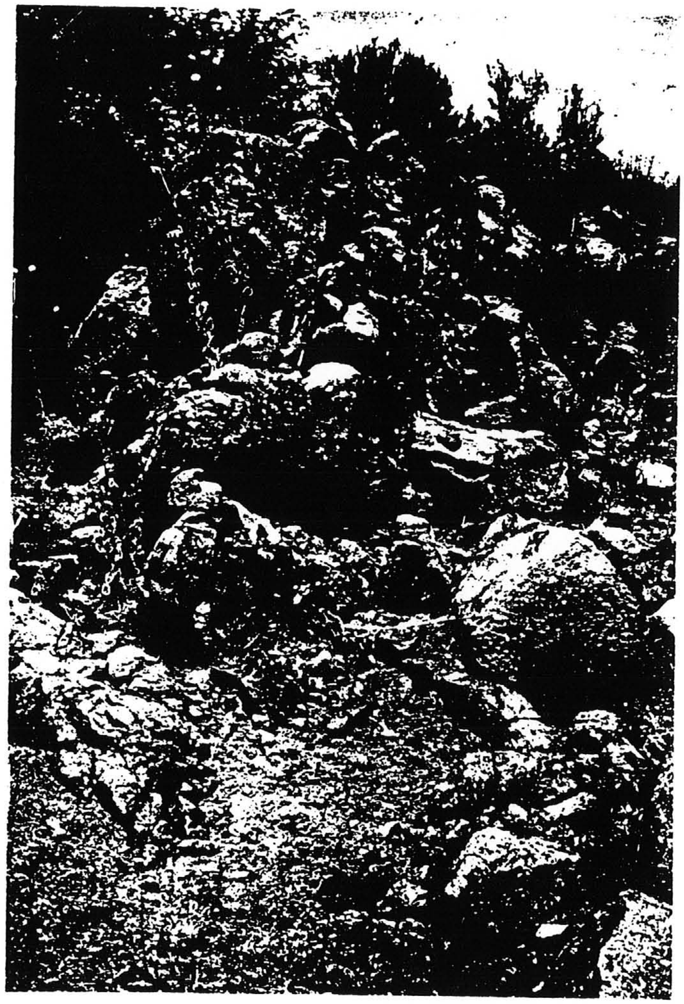


Figure 9 - View of high-angle fault zone striking N20W and dipping 80SW. Subsidiary fault on footwall of major listric "Wash Fault". Looking NW.

Figure 10 - Close up of fault surface with geomorphic expression of surface in background. West slope of south Durham Hills facing south.

Geologic Model

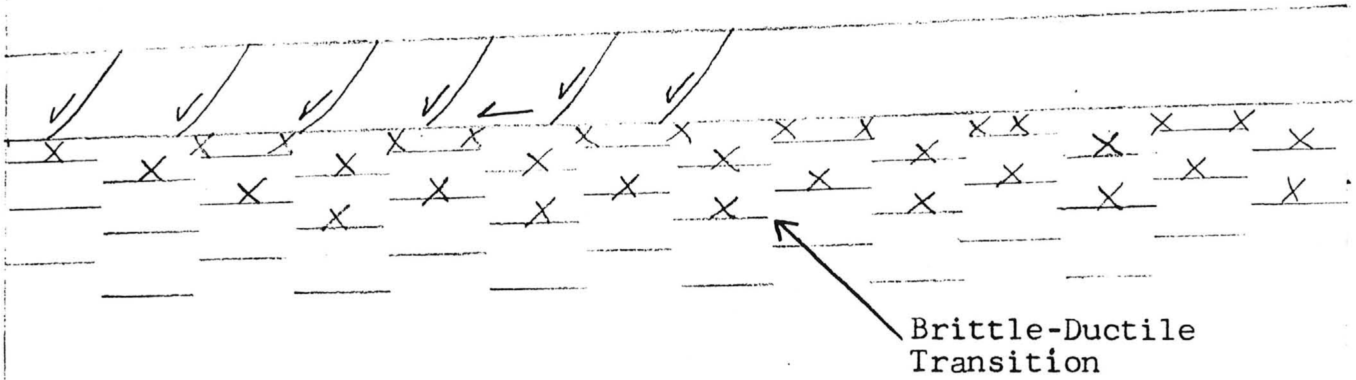
The overall picture derived from mapping the Durham Hills is depicted in the following sequence of sketches (fig. 11).

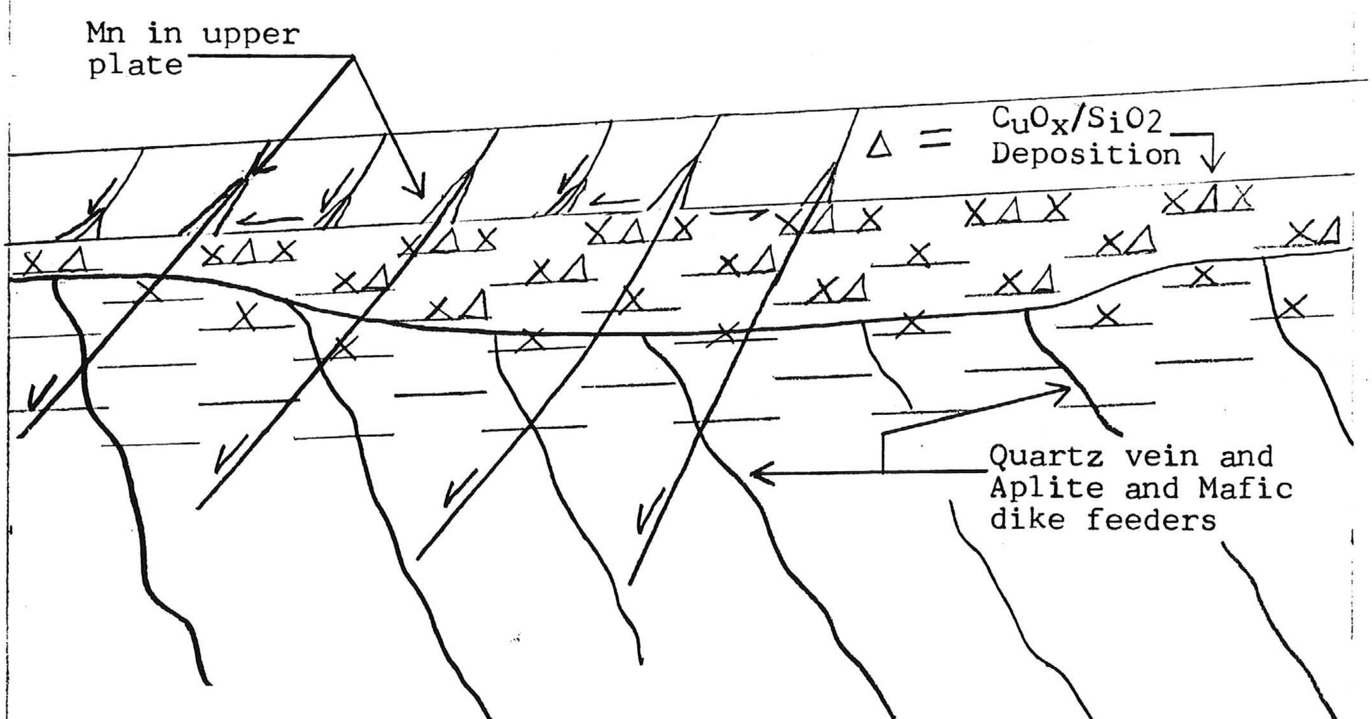
First, the initial formation of a detachment fault surface with regional shearing and extension to the southwest. Mylonitic rocks exposed in the Durham Hills are interpreted as having formed near the brittle-ductile transition boundary.

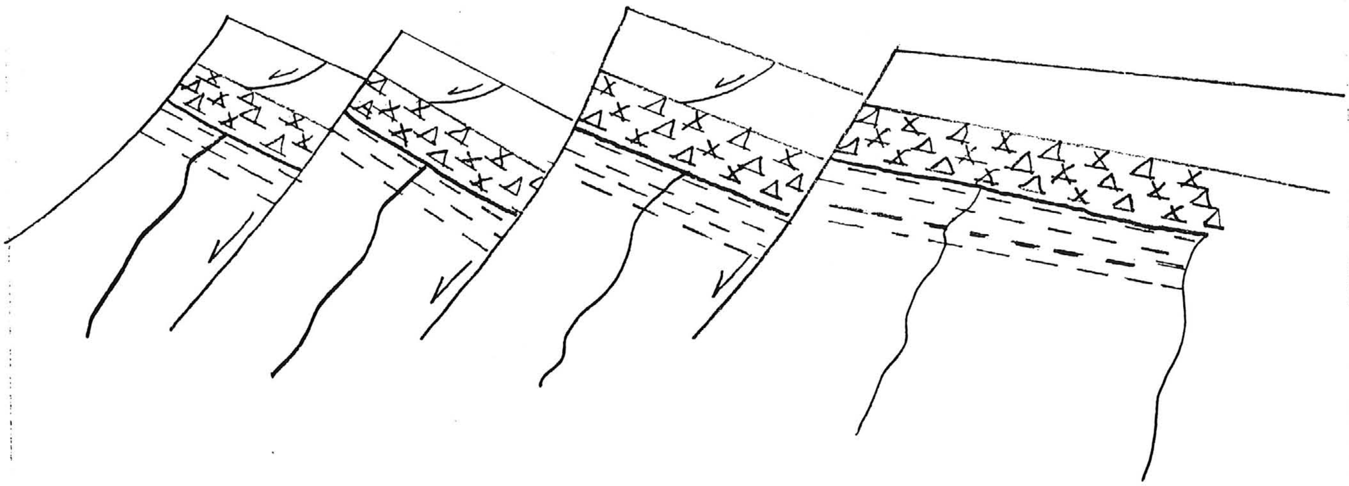
Second, continued late-stage southwest extension with the formation of perpendicular joint sets in lower plate rocks. Initially aplite dikes and later mafic dikes intrude the lower plate rocks along the joint planes. Siliceous and Cu mineralized hydrothermal fluids migrate upwards and are "trapped" beneath the structurally tight mylonitic "cap".

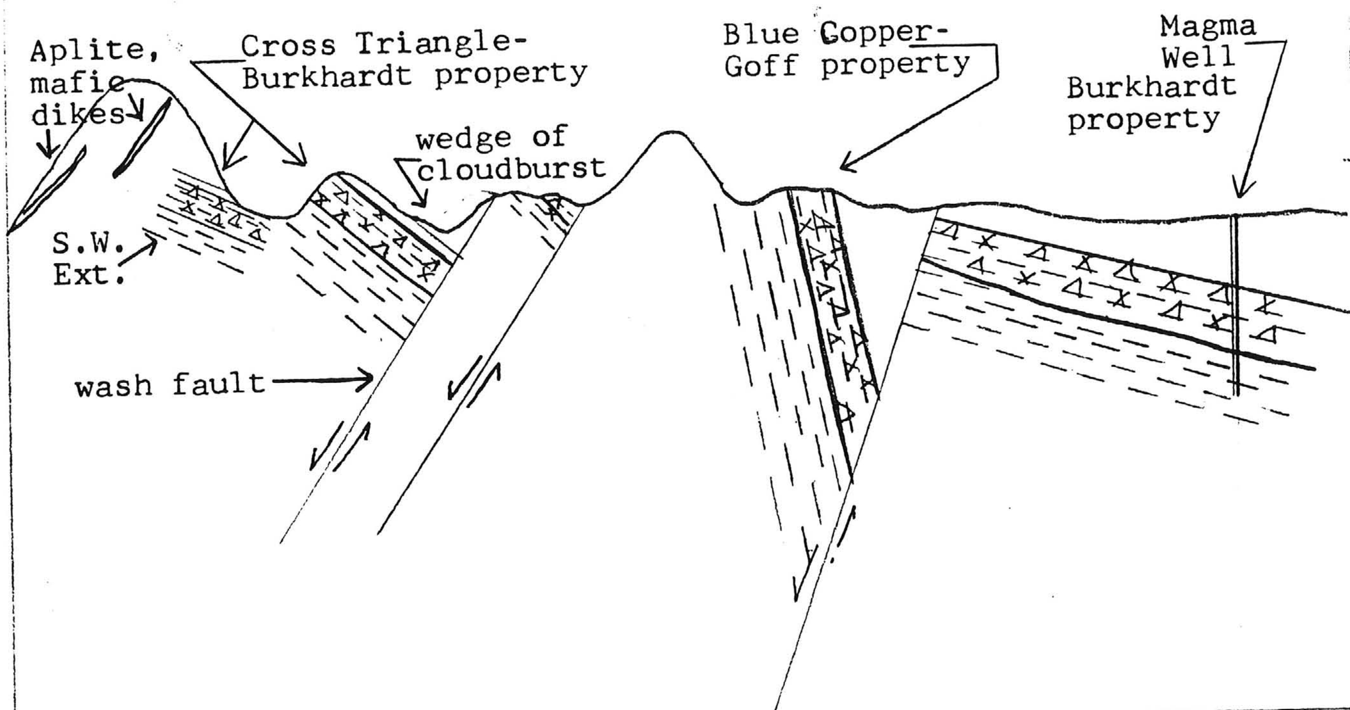
Third, continued extension results in the formation of high-angle listric normal faults and back-tilting and rotation of lower plate rocks. Coarse clastics and large landslide blocks are shed into basin formed in the overlying upper plate. Mineralization is separated into two structural blocks.

Fourth continued extension and the formation of the present day basin and range structure along high-angle, range bounding normal faults.


Brittle-Ductile
Transition


Mn in upper
plate
Δ = CuO_x/SiO_2
Deposition
Quartz vein and
Aplite and Mafic
dike feeders





Aplite,
mafic
dikes
Cross Triangle-
Burkhardt property
wedge of
cloudburst
Blue Copper-
Goff property
Magma
Well
Burkhardt
property
S.W.
Ext.
wash fault

ECONOMIC GEOLOGY OF THE DURHAM HILLS

Mineralization

CuOx -

The dominant CuOx mineral is chrysocolla, typically occurring disseminated in highly silicified rock, absorbed on highly argillized feldspars, or as secondary fracture fillings. The idea that much of the chrysocolla is of primary origin was not confirmed or discounted during the study. The chrysocolla occurring as fracture fillings, however, is certainly secondary, and was probably released from the (qm)' host rock during later faulting and fracturing. A dark black mineral was observed in close relation to chrysocolla, particularly in the Blue Copper mine, and is tentatively identified as tenorite. Locally, both malachite and azurite occur as fracture fillings associated with chrysocolla

Cu-sulphide -

Rare boxwork and associated intense Fe-staining are noted locally, particularly at the Blue Copper Mine. Chalcocite and chalcopyrite are noted in the literature but were not observed in the field. Absence of abundant sulphide is indirect evidence of a primary chrysocolla but is not in itself diagnostic. Note that both higher grade cyanide soluble and acid soluble Cu values were from the Blue Copper mine (see discussion under Sampling and Assay Results).

FeOx -

Mainly reddish-brown, earthy hematite occurring as coatings and fillings in fracture and associated with CuOx mineralization. Locally minor specularite, particularly in the extreme southern Durham Hills. Some yellow ocherous Fe mineral believed to be goethite found in the Blue Copper mine.

MnOx -

Minor occurrences in prospects located in upper plate Cloudburst, typical of detachment fault deposits. Locally spotty to dendritic occurrences in the two CuOx deposits.

Au and Ag -

Samples were not assayed for precious metals. Regionally the N. Tortolitas were prospected heavily for silver, and both Au and Ag were reportedly produced from the district.

Alteration

Silicic -

High silicification is directly related to high Cu mineralization. Unsilicified to moderately silicified rock tend to have much lower Cu values. The highly silicified rock is extremely hard and has been used as building material.

Numerous quartz veins with Cu mineralization are found cutting the quartz monzonite, often perpendicular to the strike and dip of foliation. Relic sulfide and boxwork can sometimes be found associated with the veins. These veins are thought to be good possible candidates for feeder systems into the main mineralized deposits.

Chloritic -

Chlorite occurs as both fracture coatings and as chloritized biotite in the quartz monzonite. Differentiation between chlorite associated with detachment fault processes and chlorite associated with later CuOx mineralization is unclear at present. In general, chloritization increases toward the CuOx deposits. Sheared mafic dikes are generally heavily chloritized. A local zone of heavily chloritized rocks was found N of the Blue Copper mine.

Argillic/Sericitic -

Argillic alteration of plagioclase feldspars to kaolin and sericite is directly associated with CuOx mineralization. K-spar is typically highly brecciated but remains fresh and unaltered.

Resources

Sampling and assay results -

In an attempt to obtain a grade estimate for the deposit, 55 rock chip samples were collected from selected locations at both the Blue Copper mine and the Cross Triangle mine (appendix A).

At the Blue Copper mine, 20 samples were collected from the main pit area and surrounding prospects and outcrops (#64606-#64625). In addition, 1 sample was collected from a prospect located 250' SW of the mine (#64605, west extension, fig. 12), 3 samples were collected from the prospects approximately 250' NE of the mine (#64602-#64604, east extension), and 1 sample was collected from a small outcrop approximately 2500' NW of the mine (#64601, northwest extension, fig. 13) for a total of 25 samples. A small pit just west of sample #64601 (fig. 14) was not sampled because of a beehive in the fault zone.

In the main mine area, total Cu values ranged from 0.29% to 1.82%, with an average of 0.83% total Cu. The higher grades appear to be associated with two fault zones trending N20W and N45-70E. This is interpreted as original chrysocolla (primary?) in the host rock being released and redeposited as thin fracture coating as secondary chrysocolla, +/- tenorite, malachite, and azurite. These results agree well with results reported by Fowells (1948) ranging from trace to 1.72% total Cu.

At the Cross Triangle Ranch deposit, 30 samples were collected from outcrops, roadcuts, trenches, and pits. At the north end of Rattlesnake Hill, 10 samples were collected from a roadcut/trench (#64626-#64635, fig. 15). Seven samples were collected on N. Green Hill: 1 sample from a roadcut at the northern crest of the hill (#64636), 4 samples from moderately silicified outcrops on the west slope (#64637-64640), and 2 samples from two prospects near the base of the west slope (#64641-64642). Eight samples were collected on S. Green Hill: 2 from the northeast face of the prospect (#64643-#64644), 5 from the east-central building stone quarry area (#64645-#64649, fig. 16), and 1 from the southeast face of the prospect (#64650). Five samples were collected on Blue Hill: 1 from a small prospect on the west slope of S. Blue Hill approximately 230' due east from the water tank (#64651), 3 from prospect pits and trenches along the central hilltop of S. Blue Hill (#64652-#64654, fig. 17), and 1 from a roadcut on N. Blue Hill (#64655). In addition to the roadcut, several other unsampled areas of high mineralization (fig. 18) and alteration were noted on N. Blue Hill.

On Rattlesnake Hill, the samples collected represented unsilicified (qm), highly silicified and mineralized (qm)', a sheared and chloritized mafic dike (md), and fault gouge in (qm). Values were quite disappointing, ranging from a low of 0.04% total Cu to a high of 0.29% total Cu. Results from N. Green Hill were not much improved over Rattlesnake, ranging from 0.08% to 0.11% in the main outcrop of silicified (qm). The single sample collected near the contact with the mylonitic schist ran 0.33%, while the samples collected in the isolated pits on the south slope ranged from 0.52% to 0.55% total Cu (note with minor Cn soluble Cu). Samples collected from S. Green Hill were somewhat improved over the more northerly samples, with values generally fairly consistent and ranging from 0.22% to 0.69%, and averaging 0.38% total Cu. Samples from Blue Hill were slightly higher than S. Green Hill, varying from 0.35% to 0.52% and averaging 0.44% total Cu.

Discussion of sampling and assay results -

The difference in Cu values between the lower grade Cross Triangle Ranch deposit and the higher grade Blue Copper mine might be a result of slightly higher sulfide values and somewhat thicker outcrops at Blue Copper. If the two deposits were once connected, this might indicate that Blue Copper was a more central portion of the deposit, while Cross Triangle was more towards the margins and thus thinner and lower grade. Alternatively, leaching of Cu may have already been in progress while the deposit was back-tilted but not yet offset by high-angle listric normal faulting. Thus leached Cu from the structurally higher Cross Triangle deposit may have been deposited in the structurally lower and deeper Blue Copper mine.

Figure 12 - Small pit 250' southwest of main mine, Blue Copper mine. High angle fault place unmineralized quartz monzonite on west (right) against highly silicified and mineralized quartz monzonite on east (left). Sample #64605, see also 1"=50' scale map of Blue Copper mine.

Figure 13 - Outcrop of (qm)' in wash 2500' north of Blue Copper mine. Sample #64601.

Figure 14 - Small prospect 2500' north of Blue Copper mine. High-angle fault (in shadow) places unmineralized quartz monzonite (left) against high silicifified and mineralized quartz monzonite (in bright light). No sample collected because of large beehive in fault.

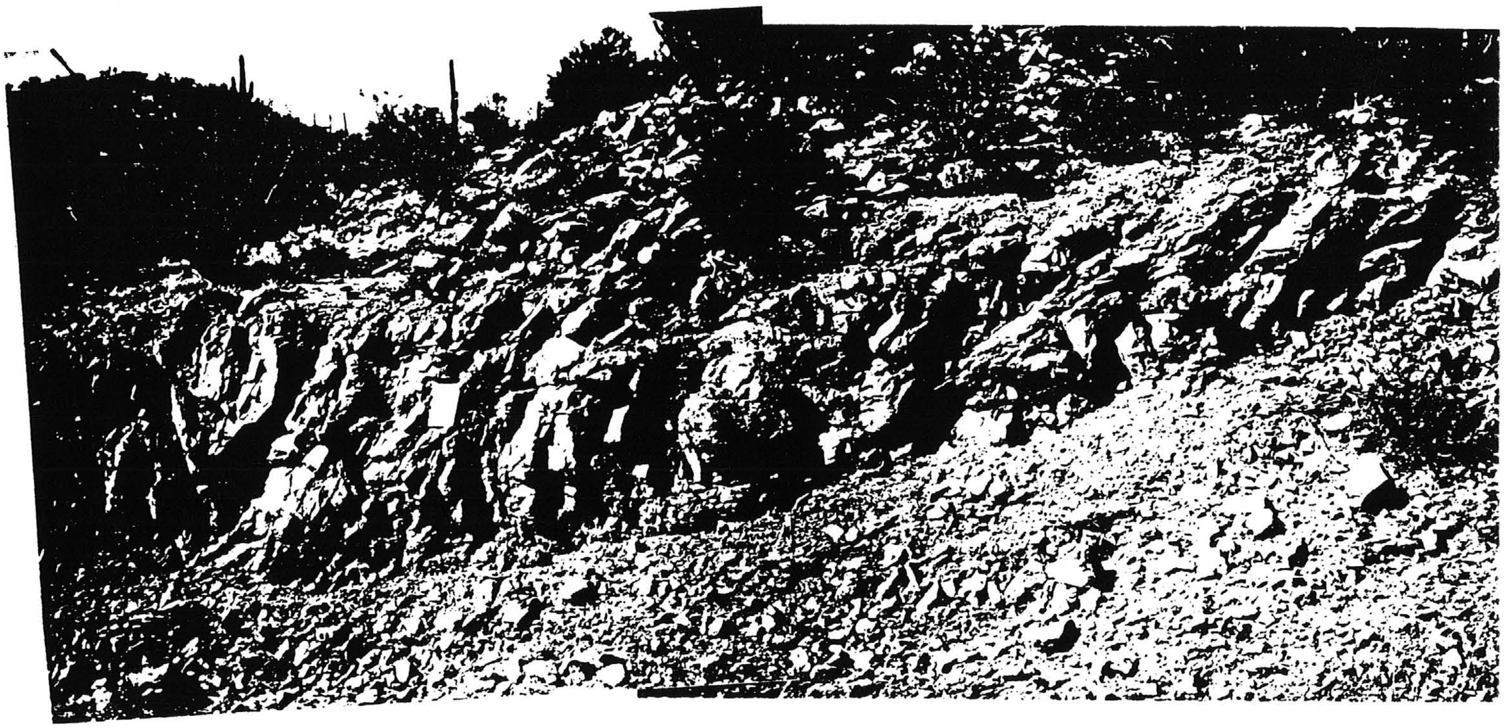


Figure 15 - Trench on northern end of Rattlesnake Hill, looking south. Samples #64630-#64635.

Figure 16 - Small central quarry on S. Green Hill, Cross Triangle deposit. Looking northwest. Samples collected, from right to left, #64645, #646~~5~~6, #64647.
4

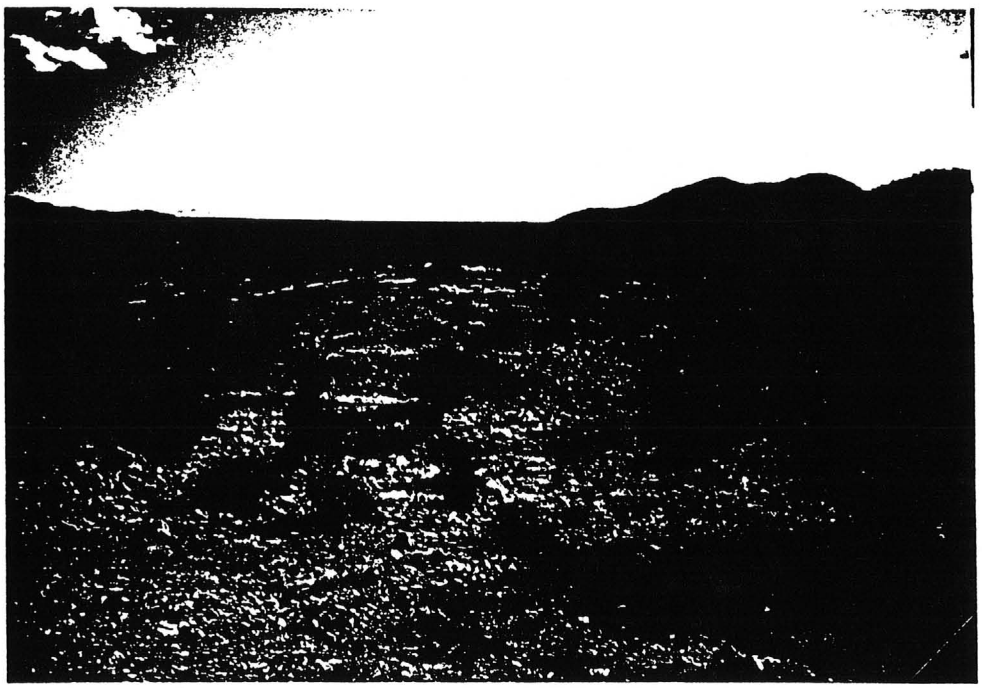


Figure 17 - Prospect and roadcuts, S. Blue
Hill looking south along ridge.
Note water tank at far left.

Figure 18 - Close up of CuOx-stained (qm)'
outcrop, near contact with
mylonitic schist, crest of N.
Blue Hill.

BLUE COPPER MINE, NW EXTENSION
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
64601	0.96%	0.91%	0.008%	95%

BLUE COPPER MINE, E EXTENSION, 3 PROSPECTS
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
64602	0.09%	0.07%	0.002%	80%
64603	1.13%	1.01%	0.003%	89%
64604	0.69%	0.63%	0.027%	91%

BLUE COPPER MINE, W EXTENSION, 1 PROSPECT
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
64605	0.88%	0.77%	0.050%	88%

BLUE COPPER MINE, MAIN MINE AREA
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
NE SHALLOW PITS AND TRENCHES				
64606	0.55%	0.52%	0.003%	95%
64607	0.58%	0.53%	0.008%	91%
64608	1.60%	1.27%	0.210%	79%
64609	0.43%	0.41%	0.003%	95%
64610	0.85%	0.82%	0.004%	96%
64611	1.82%	1.61%	0.009%	88%
NORTH CENTRAL PIT				
64612	0.71%	0.63%	0.005%	89%
64613	1.15%	1.03%	0.005%	90%
64614	1.59%	1.41%	0.026%	89%
NORTHWEST PIT				
64615	0.85%	0.77%	0.005%	91%
64616	1.34%	1.14%	0.100%	85%
MAIN MINE AREA				
64617	0.36%	0.25%	0.091%	69%
64618	0.29%	0.25%	0.006%	86%
64619	0.52%	0.47%	0.027%	90%
64620	0.31%	0.27%	0.005%	87%
64621	0.98%	0.95%	0.012%	97%
64622	1.00%	0.97%	0.017%	97%
64623	0.64%	0.62%	0.005%	97%
64624	0.53%	0.51%	0.007%	96%
SOUTHWEST OUTCROP				
64625	0.60%	0.59%	0.005%	98%

CROSS TRIANGLE MINE, RATTLESNAKE HILL
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
		ROADCUT		
64626	0.13%	0.10%	0.005%	77%
64627	0.12%	0.07%	0.006%	62%
64628	0.12%	0.10%	0.003%	83%
64629	0.29%	0.27%	0.003%	93%
		TRENCH		
64630	0.07%	0.03%	0.003%	41%
64631	0.09%	0.04%	0.005%	40%
64632	0.10%	0.07%	0.004%	74%
64633	0.11%	0.09%	0.003%	78%
64634	0.04%	0.01%	0.000%	37%
64635	0.16%	0.11%	0.006%	69%

CROSS TRIANGLE MINE, N GREEN HILL
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
		NORTH CUT AT CONTACT		
64636	0.33%	0.31%	0.006%	94%
		WEST SLOPE		
64637	0.08%	0.05%	0.007%	57%
64638	0.11%	0.07%	0.006%	66%
64639	0.08%	0.05%	0.006%	59%
64640	0.10%	0.07%	0.007%	68%
		WEST SLOPE PROSPECTS		
64641	0.52%	0.40%	0.024%	77%
64642	0.55%	0.50%	0.014%	91%

CROSS TRAINGLE MINE, S GREEN HILL
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
NE FACE NEAR MAJOR FAULT				
64643	0.22%	0.18%	0.012%	82%
64644	0.37%	0.33%	0.015%	89%
CENTRAL PIT				
64645	0.22%	0.19%	0.006%	86%
64646	0.40%	0.37%	0.010%	93%
64647	0.42%	0.39%	0.006%	93%
64648	0.29%	0.24%	0.010%	83%
64649	0.69%	0.61%	0.023%	88%
SE FACE				
64650	0.45%	0.40%	0.024%	89%

CROSS TRIANGLE MINE, S AND N BLUE HILL
ASSAY RESULTS

SAMPLE #	TOTAL CU %	ACID SOL CU %	CN SOL CU%	PERCENT ACID SOL
WEST SLOPE, SMALL PIT				
64651	0.47%	0.43%	0.011%	91%
MAIN MINERALIZED ZONE PROSPECTS				
64652	0.43%	0.40%	0.004%	93%
64653	0.35%	0.34%	0.004%	97%
64654	0.45%	0.42%	0.008%	93%
ROADCUT IN N BLUE HILL				
64655	0.52%	0.49%	0.012%	94%

Deposit geometries -

In order to establish good geologic control and document the rock chip samples, portions of the Blue Copper and Cross Triangle deposits were mapped at a scale of 1" = 50' (Plates 2 - 5).

At both the Blue Copper mine and Cross Triangle, however, the dip of the deposit is difficult to determine and is generally inferred from the dip of the surrounding rocks. Even so, at the Blue Copper mine several alternatives are possible: 1) If the deposit is controlled by the regional N20W foliation found in north Durham Hills, then projecting this foliation southwest into the deposit results in a dip of approximately 55 degrees NE. A single foliation measurement, however, at the south end of the deposit dipped 26SE. 2) Alternatively, if the deposit is controlled by a recognized N20W shearing, the dip may range from 55NE to vertical to 45SW! This shearing is possibly related to the post-detachment, high angle faulting striking through the center of the mine, in which case the dip would be vertical. 3) Finally, several dip measurements were taken on shears that trended approximately EW and dipped between 25S and 30S. Without further structural data at depth, the first alternative is preferred with the strike trending N20W and the dip averaging 55NE.

Grade and tonnage estimates -

Using generalized cross sections (fig. 19 - 25), tonnage estimates were calculated based on, dip of the mineralized body, measured thicknesses, measured and extended (assumed) strike length, and variable down dip depth projections. Data from these measured and projected dimensions, combined with estimated grades from the rock chip sampling, were used to classified the resources as inferred, target, or extended target. In this report, inferred resources refer to areas where thickness and strike length are known from detailed mapping and the grade can be estimated from rock chip sampling. The third dimension, depth, is assumed using the dip of the surrounding rocks and generalized cross section projections. Target resources refer to areas where either 1) the thickness of the mineralized body is increased assuming a lower or equivalent grade. Extended target resources are calculated using geologic inferences about the possible buried strike length of the deposit. Geologic target resources refer to areas that have not been study in detail and are therefore highly speculative. Note that the minability of the resources has not been figured into the calculations (e.g. mining method - [in situ, open pit], recoveries, waste:ore ratio, price, etc)!

Referring to the tables, generalized cross sections, and calculations in the appendix B, inferred + target resources at the Blue Copper mine are 7.0 mill s.t. at 0.48% total Cu. Including the extended target resources expands the tonnage to 43.8 mill s.t. at 0.47% total Cu. At the Cross Triangle deposit, inferred + target resources total 18.2 mill s.t. at 0.34% total Cu. Including the extended target resources expands the tonnage to 21.3 mill s.t. @ 0.32% total Cu.

Using very conservative down dip depth projections of only 100 ft, however, reduces the tonnages by approximately 85 percent. Using projections that are more optimistic but still not as deep (i.e. 250 ft), tonnages are reduced by approximately 50 percent.

TOTAL RESOURCE ESTIMATE, DURHAM HILLS
PROJECTED DOWN DIP DEPTH - 100 FT

RESOURCE TYPE	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
	CROSS TRIANGLE		
INFERRED	751,856	0.42%	6,358,943
TARGET	1,783,874	0.30%	10,529,610
SUBTOTAL	2,535,731	0.33%	16,888,554
EXTENDED	610,504	0.20%	2,442,014
TOTAL	3,146,234	0.31%	19,330,568
	BLUE COPPER		
INFERRED	655,322	0.79%	10,403,231
TARGET	737,237	0.20%	2,948,947
SUBTOTAL	1,392,558	0.48%	13,352,178
EXTENDED	7,372,368	0.47%	68,808,772
TOTAL	8,764,927	0.47%	82,160,950
TOTAL DURHAM HILLS INFER+TARGET	3,928,289	0.38%	30,240,732
TOTAL DURHAM HILLS INF+TAR+EXT	11,300,657	0.44%	99,049,504

TOTAL RESOURCE ESTIMATE, DURHAM HILLS
PROJECTED DOWN DIP DEPTH - 250 FT

RESOURCE TYPE	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
	CROSS TRIANGLE		
INFERRED	1,879,640	0.42%	15,897,359
TARGET	4,459,686	0.30%	26,324,025
SUBTOTAL	6,339,326	0.33%	42,221,384
EXTENDED	1,526,259	0.20%	6,105,035
TOTAL	7,865,585	0.31%	48,326,419
	BLUE COPPER		
INFERRED	1,638,304	0.79%	26,008,077
TARGET	1,843,092	0.20%	7,372,368
SUBTOTAL	3,481,396	0.48%	33,380,446
EXTENDED	18,430,921	0.47%	172,021,929
TOTAL	21,912,317	0.47%	205,402,375
TOTAL DURHAM HILLS INFER+TARGET	9,820,723	0.38%	75,601,830
TOTAL DURHAM HILLS INF+TAR+EXT	28,251,644	0.44%	247,623,759

TOTAL RESOURCE ESTIMATE, DURHAM HILLS
PROJECTED DOWN DIP DEPTH - 250 FT TO 500 FT

RESOURCE TYPE	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
		CROSS TRIANGLE	
INFERRED	5,209,937	0.43%	44,431,791
TARGET	12,950,073	0.30%	77,256,136
SUBTOTAL	18,160,009	0.34%	121,687,927
EXTENDED	3,164,563	0.20%	12,658,252
TOTAL	21,324,572	0.32%	134,346,179
		BLUE COPPER	
INFERRED	3,276,608	0.79%	52,016,155
TARGET	3,686,184	0.20%	14,744,737
SUBTOTAL	6,962,792	0.48%	66,760,892
EXTENDED	36,861,842	0.47%	344,043,859
TOTAL	43,824,634	0.47%	410,804,750
TOTAL DURHAM HILLS INFER+TARGET	25,122,802	0.38%	188,448,819
TOTAL DURHAM HILLS INF+TAR+EXT	61,984,644	0.43%	532,492,677

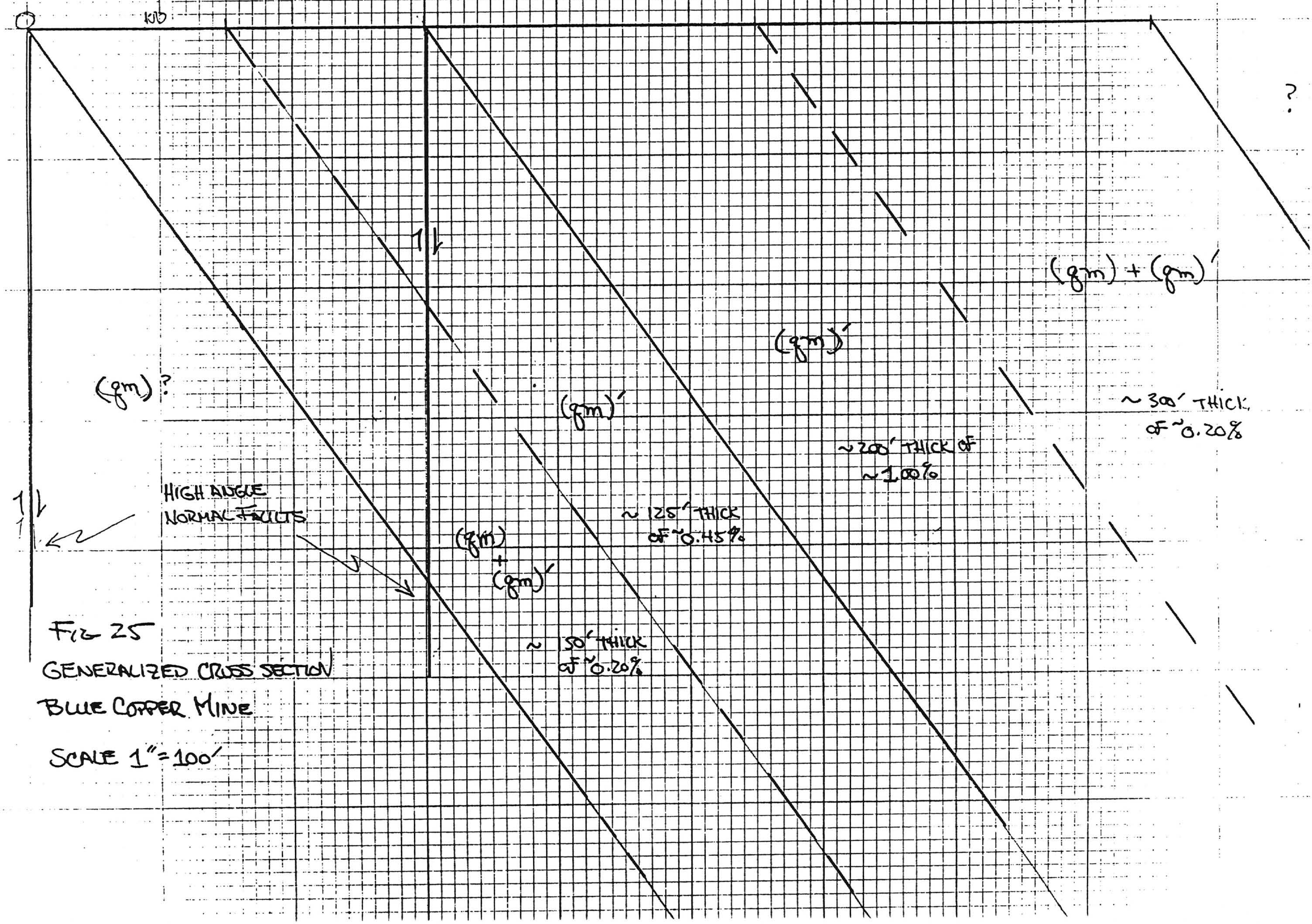


Fig 25
GENERALIZED CROSS SECTION
BLUE COPPER MINE
SCALE 1" = 100'

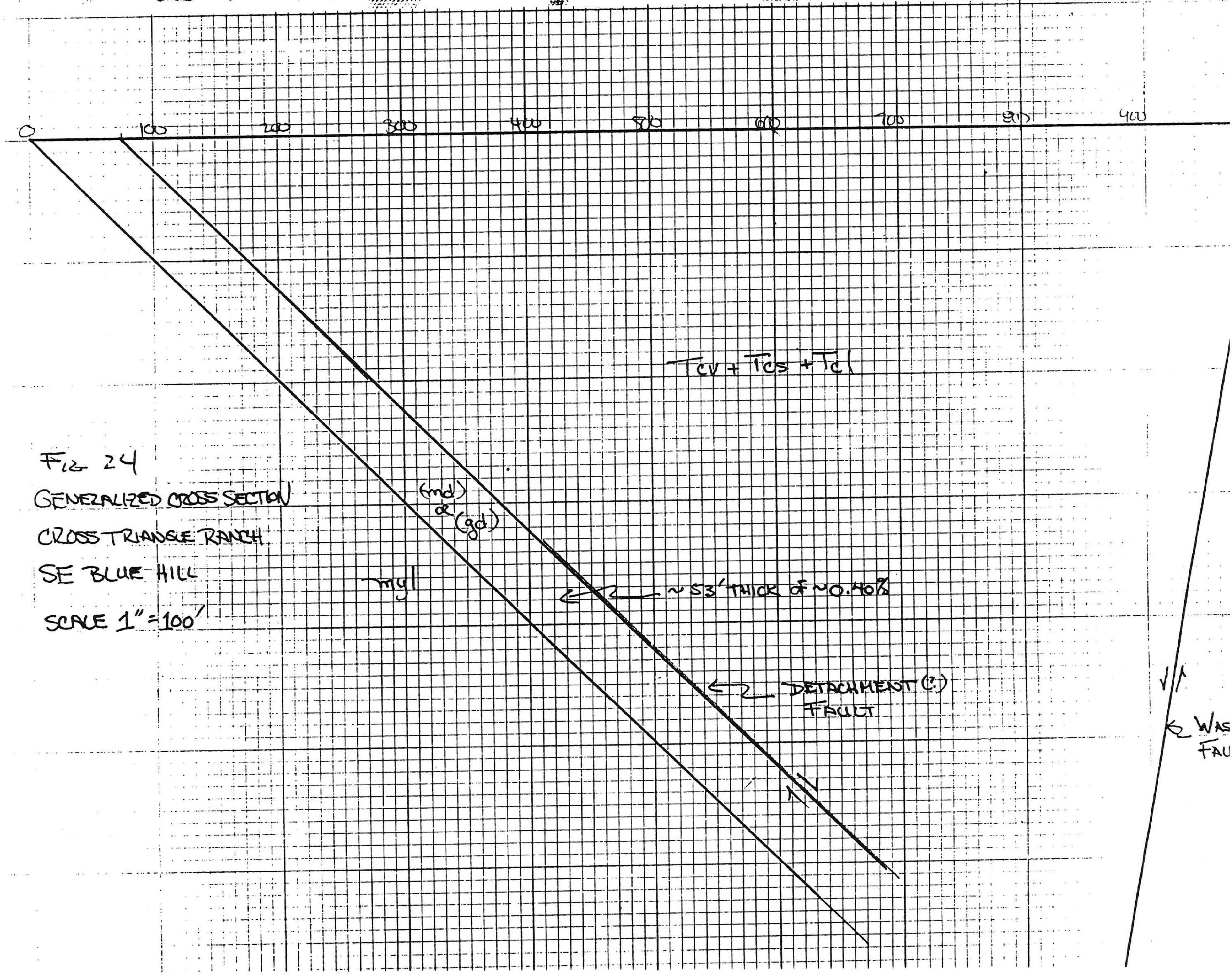


Fig 24
Generalized Cross Section
Cross Triangle Ranch
SE Blue Hill
Scale 1" = 100'

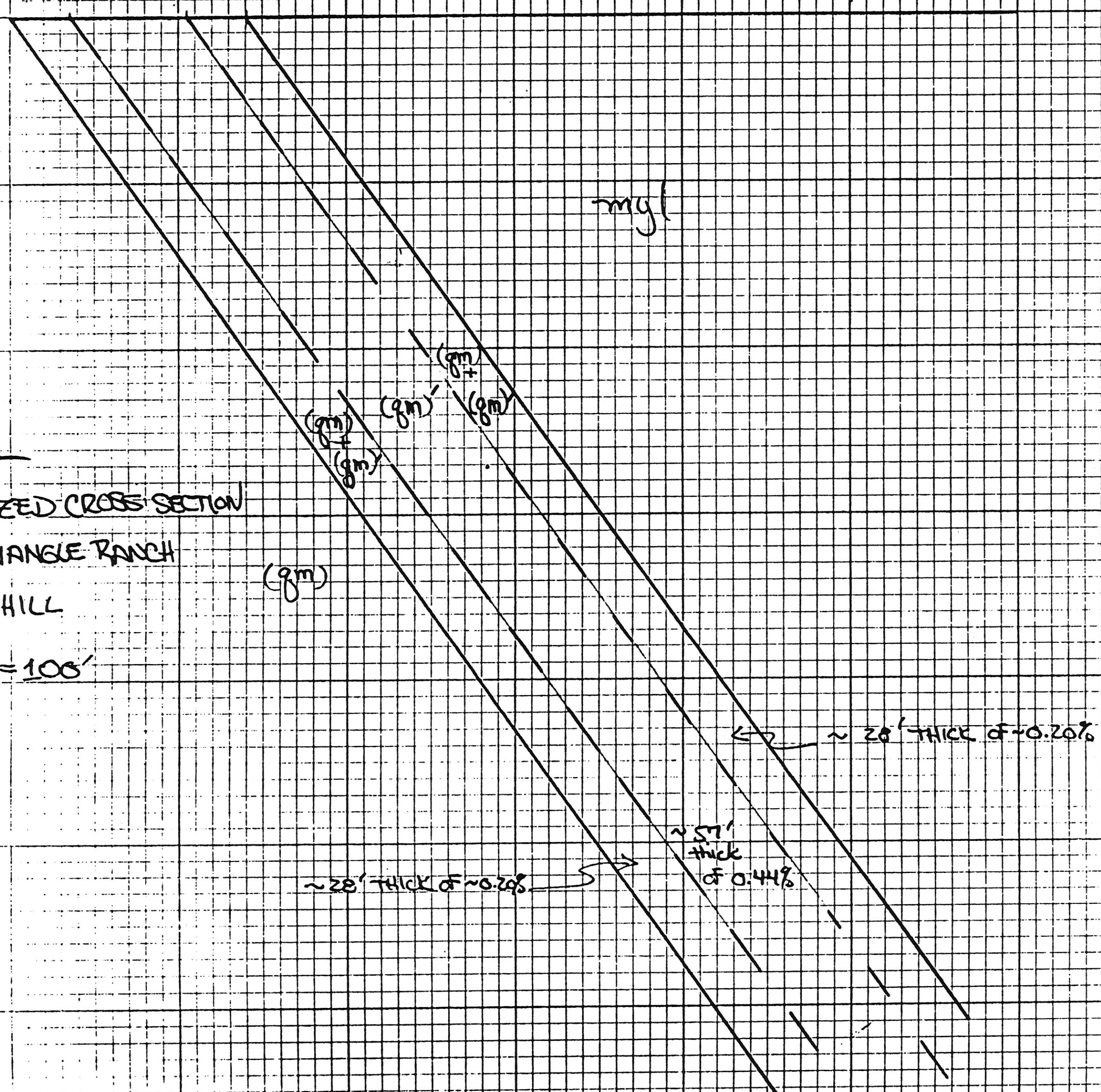
FIG 23

GENERALIZED CROSS SECTION

CROSS TRIANGLE RANCH

S. BLUE HILL

SCALE 1" = 100'



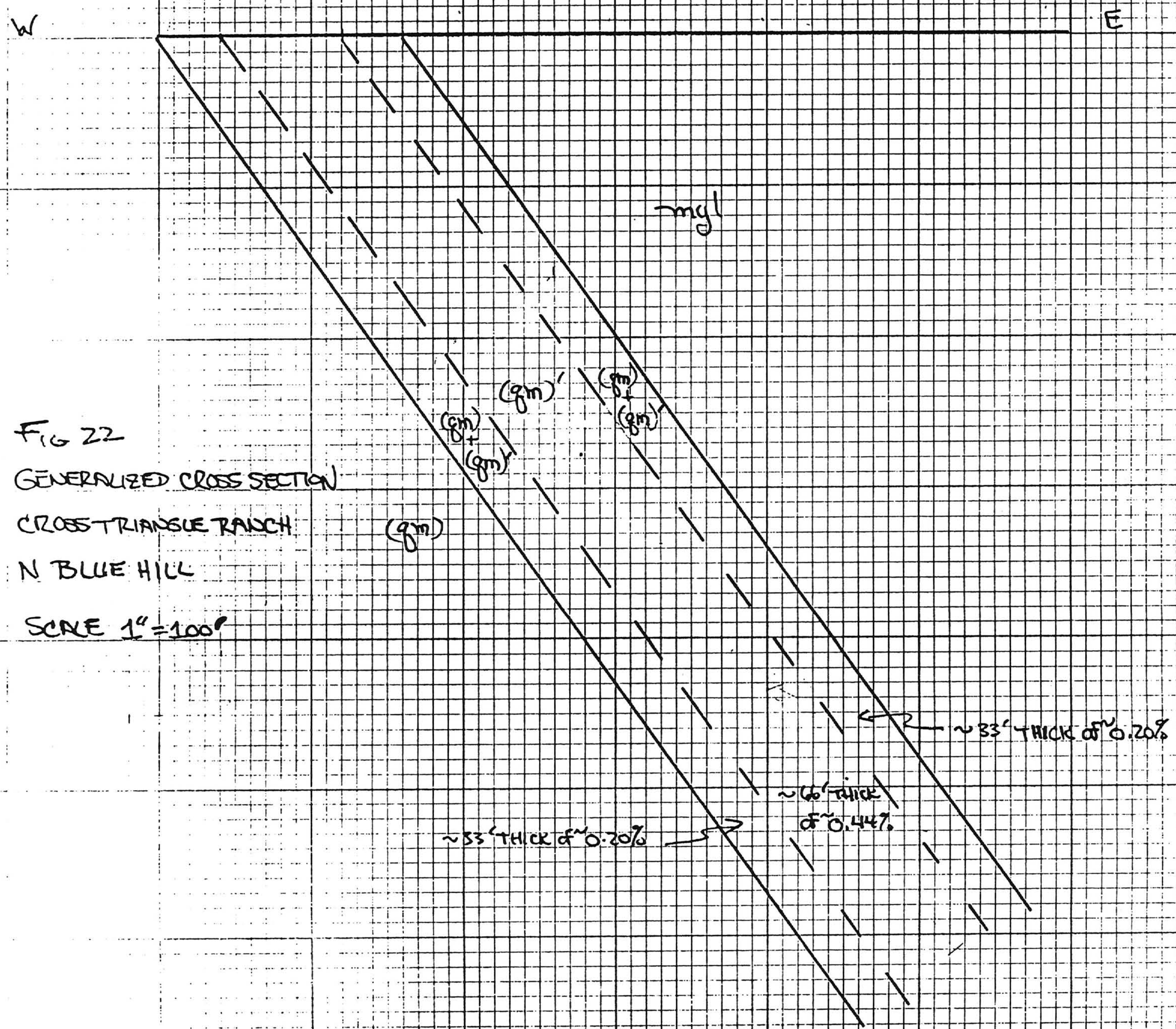


FIG 22
GENERALIZED CROSS SECTION
CROSS TRIANGLE RANCH
N BLUE HILL
SCALE 1" = 100'

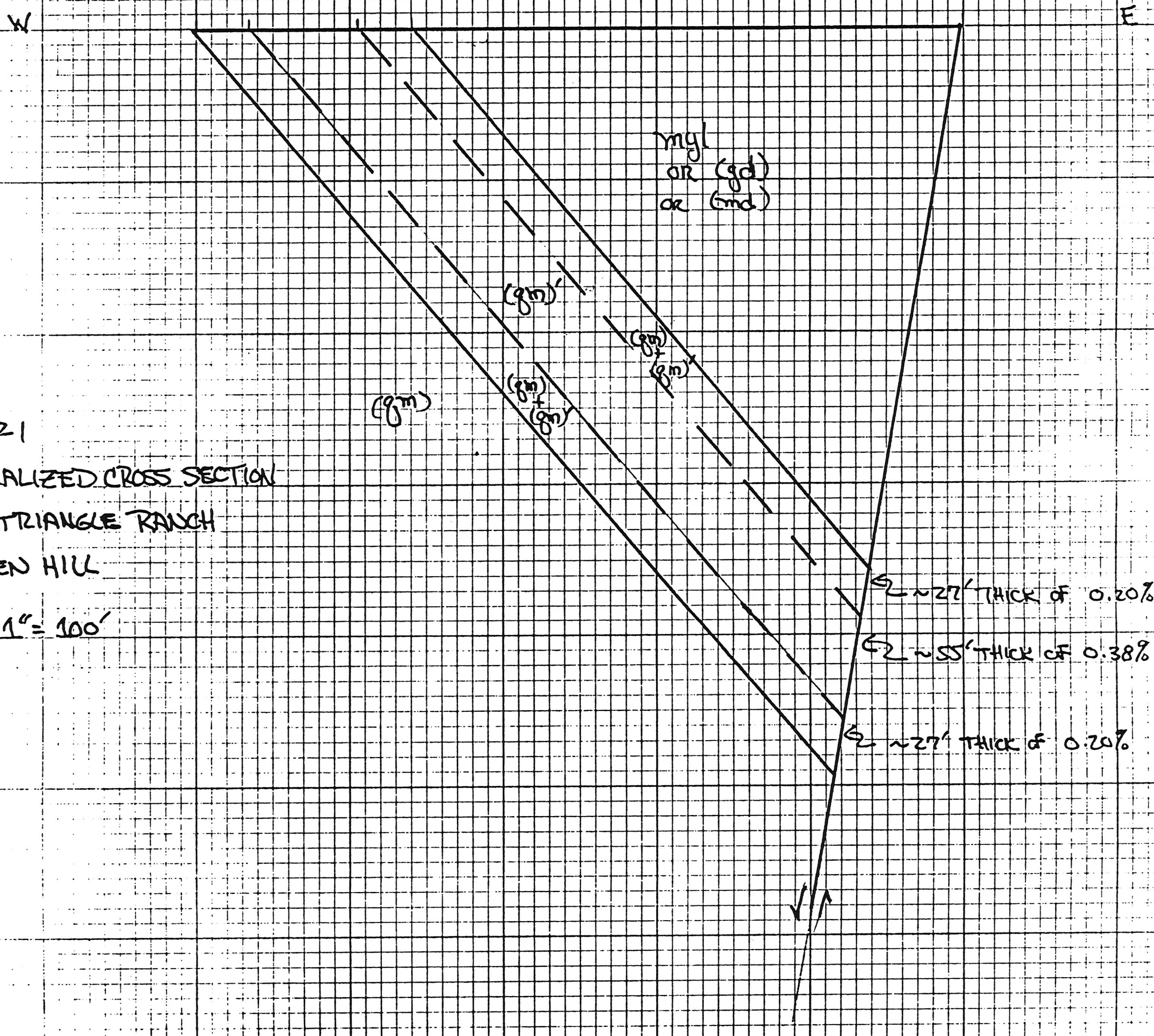


FIG 21

GENERALIZED CROSS SECTION

CROSS TRIANGLE RANCH

S. GREEN HILL

SCALE 1" = 100'

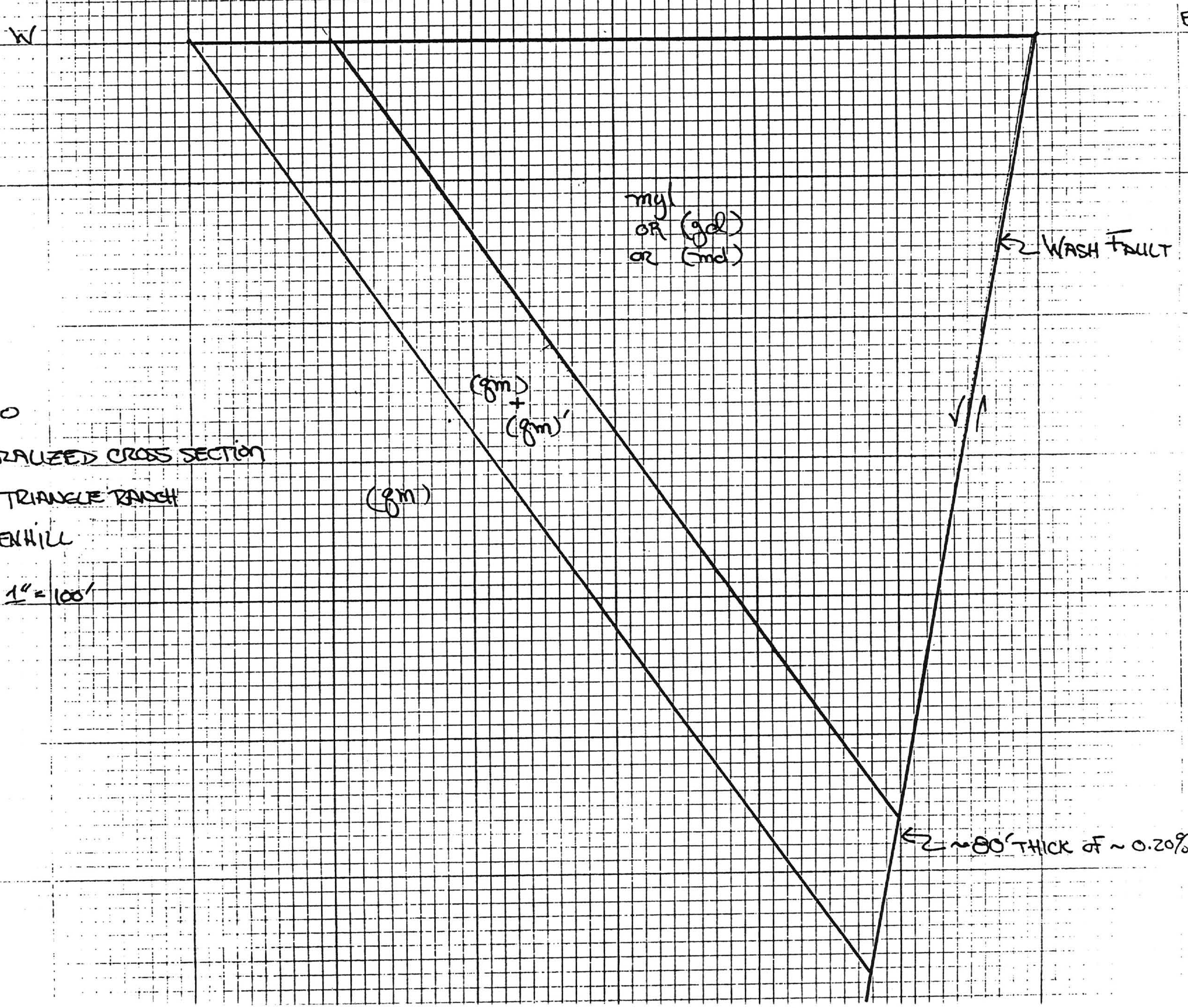


Fig 20

GENERALIZED CROSS SECTION

CROSS TRIANGLE RANCH

N GREENHILL

SCALE 1" = 100'

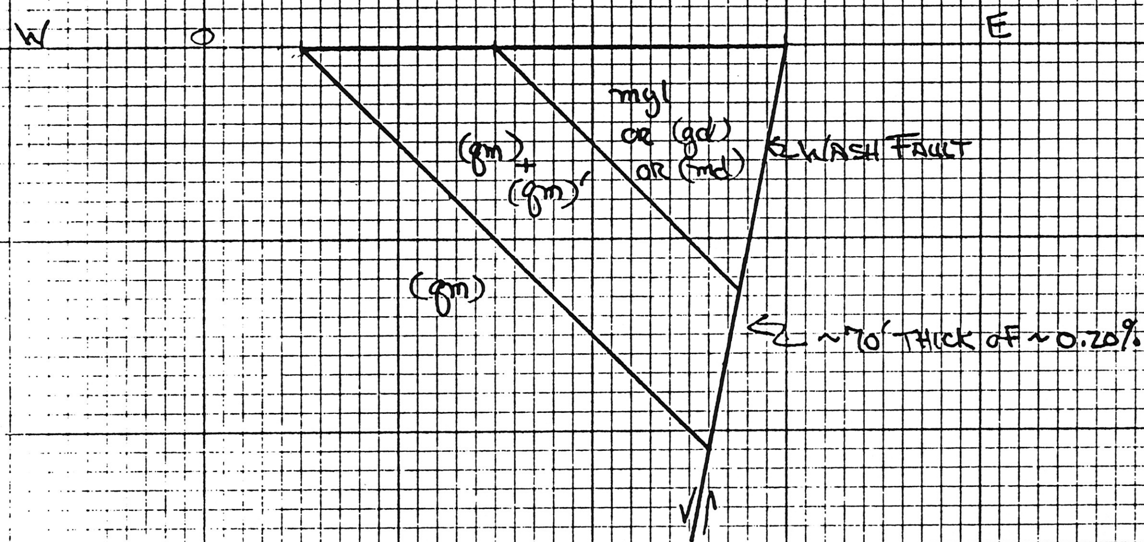


Fig 19

GENERALIZED CROSS SECTION

CROSS TRIANGLE RANCH

RATTLESNAKE HILL

SCALE 1" = 100'

(qm) - SHEARED QUARTZ MONZONITE

(qm)' - SHEARED & MINERALIZED QUARTZ MONZONITE

myl - mylonitic SCHIST

(gd) = SHEARED GRANODIORITE

(md) = SHEARED MAFIC DIKE

Tcv, Tcs, Tcl - Cloudburst VOLCANICS, SEDIMEN

& landslide block

CONCLUSIONS

Copper mineralization in the Durham Hills is structurally controlled by a regional, mid-Tertiary detachment fault related to the Rincon-Santa Catalina-Tortolita Mountains metamorphic core complex. The deposit has been subsequently rotated and offset into two structural blocks by mid- to late-Tertiary high-angle listric normal faulting. A very conservative resource estimate for the Durham Hills is calculated at 3.9 mill s.t. of 0.38% total copper (inferred + target @ 100 ft down-dip projection). Adding in the possibility of buried extensions with a slightly more optimistic depth projections increases the resources to 28 mill s.t. of 0.44% total copper (inferred + target + extended target @ 250 ft down-dip projection). Extending the down-dip depth projection in a range from 250 ft to 750 ft (the projected intersection with the offsetting Wash Fault) increases the resources to 62 mill s.t. of 0.43% total Cu.

REFERENCES

Banks, N.G., 1980, Geology of a zone of metamorphic core complexes in southeastern Arizona, in Crittenden, M.D., Jr., Coney, P.J., and Davis, G.H., eds, Cordilleran metamorphic core complexes: Geological Society of America Memoir 153.

Banks, N.G., Dockter, R.D., Briskey, J.A., Davis, G.H., Keith, S.B., Budden, R.T., Kiven, C.W., and Anderson, P., 1977, Reconnaissance geologic map of the Tortolilta Mountains quadrangle, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-864, scale 1:62,500

Barter, C.F., 1962, Geology of the Owl Head mining district, Pinal County, Arizona: University of Arizona M.S. thesis.

Budden, R.T., 1975, The Tortolita-Santa Catalina Mountain complex: University of Arizona M.S. thesis.

Cities Service Mineral Corporation, 1973, Aeromagnetic Survey Tortolita Mtns. Project, Pinal County, Arizona: Private files, Magma Copper Company NF-File, (formerly Cities Service files), scale 1:31,250.

Dickinson, W.R., 1987, General geologic map of Catalina core complex and San Pedro trough: Arizona Geological Survey Miscellaneous Map Series MM-87-A, scale 1:62,500.

Dickinson, W.R., 1991, Tectonic setting of faulted Tertiary strata associated with the Catalina core complex in southern Arizona: Geological Society of America Special Paper 264.

DMMR, 1943, Field engineers report on the Blue Copper property: Arizona Department of Mines and Mineral Resources Open-File Report.

Fowells, J.E., 1948, Reconnaissance examination of the Edwards group of claims: Private report, Magma Copper Company.

Hanks, T.L., 1968, Potential porphyry copper deposit, Owl Head mining district, Pinal County, Arizona: Private report, Magma Copper Company NF-Files (former Cities Service file).

Keith, S.B., Reynolds, S.J., Damon, P.E., Shafiqullah, M., Livingston, D.E., and Pushkar, P.D., 1980, Evidence for multiple intrusion and deformation within the Santa Catalina-Rincon-Tortolita crystalline complex, southeastern Arizona, in Crittenden, M.D., Jr., Coney, P.J., and Davis, G.H., eds, Cordilleran metamorphic core complexes: Geological Society of America Memoir 153.

Long, K.R., 1992, Preliminary descriptive deposit model for detachment-fault related mineralization, in Bliss, J.D., ed., Developments in mineral deposit modeling: U.S.

Geological Survey Bulletin 2004.

Long, K.R., 1993, Grade-tonnage data for detachment-fault related polymetallic deposits: U.S. Geological Survey Open-File Report OFR 93-228.

More, S.W., 1992, Preliminary report and recommendations on Burkhardt copper submittal, secs. 18-21, T. 8 S., R. 12 E., Pinal County, Arizona: Private report, Magma Copper Company NF-Files.

Rehrig, W.A., and Reynolds, S.J., 1980, Geologic and geochronologic reconnaissance of a northwest-trending zone of metamorphic core complexes in southern and western Arizona, in Crittenden, M.D., Jr., Coney, P.J., and Davis, G.H., eds, Cordilleran metamorphic core complexes: Geological Society of America Memoir 153.

Reynolds, S.J., 1985, Geology of the South Mountains, central Arizona: Arizona Bureau of Geology and Mineral Technology, Bulletin 195.

Walker, W.W., 1969, A preliminary study of the metallurgical feasibility of leaching the oxide copper at the Blue Glass and adjacent properties, Pinal County, Arizona: Private report, Magma Copper Company NF-Files.

Wilkins, J., Jr., Beane, R.E., and Heidrick, T.L., 1986, Mineralization related to detachment faults: a model, in Beatty, B., and Wilkinson, P.A.K., eds., Frontiers in geology and ore deposits of Arizona and the southwest: Arizona Geological Society Digest volume 16.

Yeend, W., 1976, Reconnaissance geologic map of the Picacho Mountains, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-778, scale 1:62,500.

APPENDIX

Assay Results

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

REPORT OF ANALYSIS

JOB NO. WEN 008
October 25, 1993
64601-64635

Mr. Jon Shenk
P. O. Box 1036
Mammoth, AZ 85618

Analysis of 35 Rock Chip Samples

ITEM	SAMPLE NO.	Cu (%)	asCu (%)	cnCu (%)
1	64601	.96	.910	.008
2	64602	.09	.072	.002
3	64603	1.13	1.010	.003
4	64604	.69	.630	.027
5	64605	.88	.770	.050
6	64606	.55	.520	.003
7	64607	.58	.530	.008
8	64608	1.60	1.270	.210
9	64609	.43	.410	.003
10	64610	.85	.820	.004
11	64611	1.82	1.610	.009
12	64612	.71	.630	.005
13	64613	1.15	1.030	.005
14	64614	1.59	1.410	.026
15	64615	.85	.770	.005
16	64616	1.34	1.140	.100
17	64617	.36	.250	.091
18	64618	.29	.250	.006
19	64619	.52	.470	.027
20	64620	.31	.270	.005
21	64621	.98	.950	.012
22	64622	1.00	.970	.017
23	64623	.64	.620	.005
24	64624	.53	.510	.007
25	64625	.60	.590	.005

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

JOB NO. WEN 008
October 25, 1993

ITEM	SAMPLE NO.	Cu (%)	asCu (%)	cnCu (%)
26	64626	.13	.100	.005
27	64627	.12	.074	.006
28	64628	.12	.100	.003
29	64629	.29	.270	.003
30	64630	.07	.029	.003
31	64631	.09	.036	.005
32	64632	.10	.074	.004
33	64633	.11	.086	.003
34	64634	.04	.015	.001
35	64635	.16	.110	.006

cc: MAGMA COPPER COMPANY
Attn: Mr. Chuck Gaston
7400 N. Oracle #200
Tucson, AZ 85704

9427
CHARLES E.
THOMPSON

Charles E. Thompson
Chief Chemist 10/25/93

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

REPORT OF ANALYSIS

JOB NO. WEN 009
October 25, 1993
64636-64655

Mr. Jon Shenk
P. O. Box 1036
Mammoth, AZ 85618

Analysis fo 20 Rock Chip Samples

ITEM	SAMPLE NO.	Cu (%)	asCu (%)	cnCu (%)
1	64636	.33	.310	.006
2	64637	.08	.046	.007
3	64638	.11	.073	.006
4	64639	.08	.047	.006
5	64640	.10	.068	.007
6	64641	.52	.400	.024
7	64642	.55	.500	.014
8	64643	.22	.180	.012
9	64644	.37	.330	.015
10	64645	.22	.190	.006
11	64646	.40	.370	.010
12	64647	.42	.390	.006
13	64648	.29	.240	.010
14	64649	.69	.610	.023
15	64650	.45	.400	.024
16	64651	.47	.430	.011
17	64652	.43	.400	.004
18	64653	.35	.340	.004
19	64654	.45	.420	.008
20	64655	.52	.490	.012

cc: Mr. Chuck Gaston

REGISTERED ASSAYER CERTIFICATE NO. 9427 CHARLES E. THOMPSON Arizona U. S. A.

William L. Lehmbeck
Manager
10/25/93

APPENDIX

Tonnage Calculations

INFERRED RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 100 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	100	500	214,492	0.38%	1,630,143
N BLUE HILL	80	55	66	100	500	262,129	0.44%	2,306,732
S BLUE HILL	70	55	57	100	600	275,235	0.44%	2,422,069
INFERRED RESOURCES TOTAL						751,856	0.42%	6,358,943

TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 100 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	100	500	214,492	0.20%	857,970
N BLUE HILL	80	55	66	100	500	262,129	0.20%	1,048,515
S BLUE HILL	70	55	57	100	1000	458,725	0.20%	1,834,901
SE BLUE HILL	75	45	53	100	2000	848,528	0.40%	6,788,225
TARGET RESOURCES TOTAL						1,783,874	0.30%	10,529,610

EXTENDED TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 100 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
RATTLESNAKE	100	45	71	100	500	282,843	0.20%	1,131,371
N GREEN HILL	100	55	82	100	500	327,661	0.20%	1,310,643
EXTENDED TARGET RESOURCES TOTAL						610,504	0.20%	2,442,014

TOTAL RESOURCES - INFERRED + TARGET	2,535,731	0.33%	16,888,554
TOTAL RESOURCES - INFERRED + TARGET + EXTENDED	3,146,234	0.31%	19,330,568

INFERRED RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	250	500	536,231	0.38%	4,075,356
N BLUE HILL	80	55	66	250	500	655,322	0.44%	5,766,830
S BLUE HILL	70	55	57	250	600	688,088	0.44%	6,055,172
INFERRED RESOURCES TOTAL						1,879,640	0.42%	15,897,359

TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	250	500	536,231	0.20%	2,144,924
N BLUE HILL	80	55	66	250	500	655,322	0.20%	2,621,287
S BLUE HILL	70	55	57	250	1000	1,146,813	0.20%	4,587,251
SE BLUE HILL	75	45	53	250	2000	2,121,320	0.40%	16,970,563
TARGET RESOURCES TOTAL						4,459,686	0.30%	26,324,025

EXTENDED TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
RATTLESNAKE	100	45	71	250	500	707,107	0.20%	2,828,427
N GREEN HILL	100	55	82	250	500	819,152	0.20%	3,276,608
EXTENDED TARGET RESOURCES TOTAL						1,526,259	0.20%	6,105,035

TOTAL RESOURCES - INFERRED + TARGET	6,339,326	0.33%	42,221,384
TOTAL RESOURCES - INFERRED + TARGET + EXTENDED	7,865,585	0.31%	48,326,419

INFERRED RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
MAIN MINE	250	55	205	250	250	1,023,940	1.00%	20,478,801
MAIN MINE	150	55	123	250	250	614,364	0.45%	5,529,276
INFERRED RESOURCES TOTAL						1,638,304	0.79%	26,008,077

TARGET RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
MAIN MINE EX	450	55	369	250	250	1,843,092	0.20%	7,372,368
TARGET RESOURCES TOTAL						1,843,092	0.20%	7,372,368

EXTENDED TARGET RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 250 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
NORTH EXT	250	55	205	250	2500	10,239,401	0.60%	122,872,807
NORTH EXT	150	55	123	250	2500	6,143,640	0.20%	24,574,561
SOUTH EXT	250	55	205	250	500	2,047,880	0.60%	24,574,561
SOUTH EXT	150	55	123	250	500	1,228,728	0.20%	4,914,912
EXTENDED TARGET TOTAL						18,430,921	0.47%	172,021,929

TOTAL RESOURCES INFERRED + TARGET	3,481,396	0.48%	33,380,446
TOTAL RESOURCES INFERRED+TARGET+EXTENDED	21,912,317	0.47%	205,402,375

INFERRED RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 550 FT TO 750 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	550	500	1,179,708	0.38%	8,965,784
N BLUE HILL	80	55	66	750	500	1,965,965	0.44%	17,300,491
S BLUE HILL	70	55	57	750	600	2,064,263	0.44%	18,165,516
INFERRED RESOURCES TOTAL						5,209,937	0.43%	44,431,791

TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 550 FT TO 750 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
S GREEN HILL	70	50	54	550	500	1,179,708	0.20%	4,718,834
N BLUE HILL	80	55	66	750	500	1,965,965	0.20%	7,863,860
S BLUE HILL	70	55	57	750	1000	3,440,439	0.20%	13,761,754
SE BLUE HILL	75	45	53	750	2000	6,363,961	0.40%	50,911,688
TARGET RESOURCES TOTAL						12,950,073	0.30%	77,256,136

EXTENDED TARGET RESOURCES, CROSS TRIANGLE RANCH MINE
PROJECTED DOWN DIP DEPTH - 250 FT TO 750

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
RATTLESNAKE	100	45	71	250	500	707,107	0.20%	2,828,427
N GREEN HILL	100	55	82	750	500	2,457,456	0.20%	9,829,825
EXTENDED TARGET RESOURCES TOTAL						3,164,563	0.20%	12,658,252

TOTAL RESOURCES - INFERRED + TARGET	18,160,009	0.34%	121,687,927
TOTAL RESOURCES - INFERRED + TARGET + EXTENDED	21,324,572	0.32%	134,346,179

INFERRED RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 500 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
MAIN MINE	250	55	205	500	250	2,047,880	1.00%	40,957,602
MAIN MINE	150	55	123	500	250	1,228,728	0.45%	11,058,553
INFERRED RESOURCES TOTAL						3,276,608	0.79%	52,016,155

TARGET RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 500 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
MAIN MINE EX	450	55	369	500	250	3,686,184	0.20%	14,744,737
TARGET RESOURCES TOTAL						3,686,184	0.20%	14,744,737

EXTENDED TARGET RESOURCES, BLUE COPPER MINE
PROJECTED DOWN DIP DEPTH - 500 FT

LOCATION	HORIZON DISTANCE	DIP OF DEPOSIT	THICK FT	DEPTH FT	STRIKE FT	SHORT TONS	GRADE TOT CU	CONTAINED CU (LBS)
NORTH EXT	250	55	205	500	2500	20,478,801	0.60%	245,745,613
NORTH EXT	150	55	123	500	2500	12,287,281	0.20%	49,149,123
SOUTH EXT	250	55	205	500	500	4,095,760	0.60%	49,149,123
SOUTH EXT	150	55	123	500	500	2,457,456	0.20%	9,829,825
EXTENDED TARGET TOTAL						36,861,842	0.47%	344,043,859

TOTAL RESOURCES INFERRED + TARGET	6,962,792	0.48%	66,760,892
TOTAL RESOURCES INFERRED+TARGET+EXTENDED	43,824,634	0.47%	410,804,750

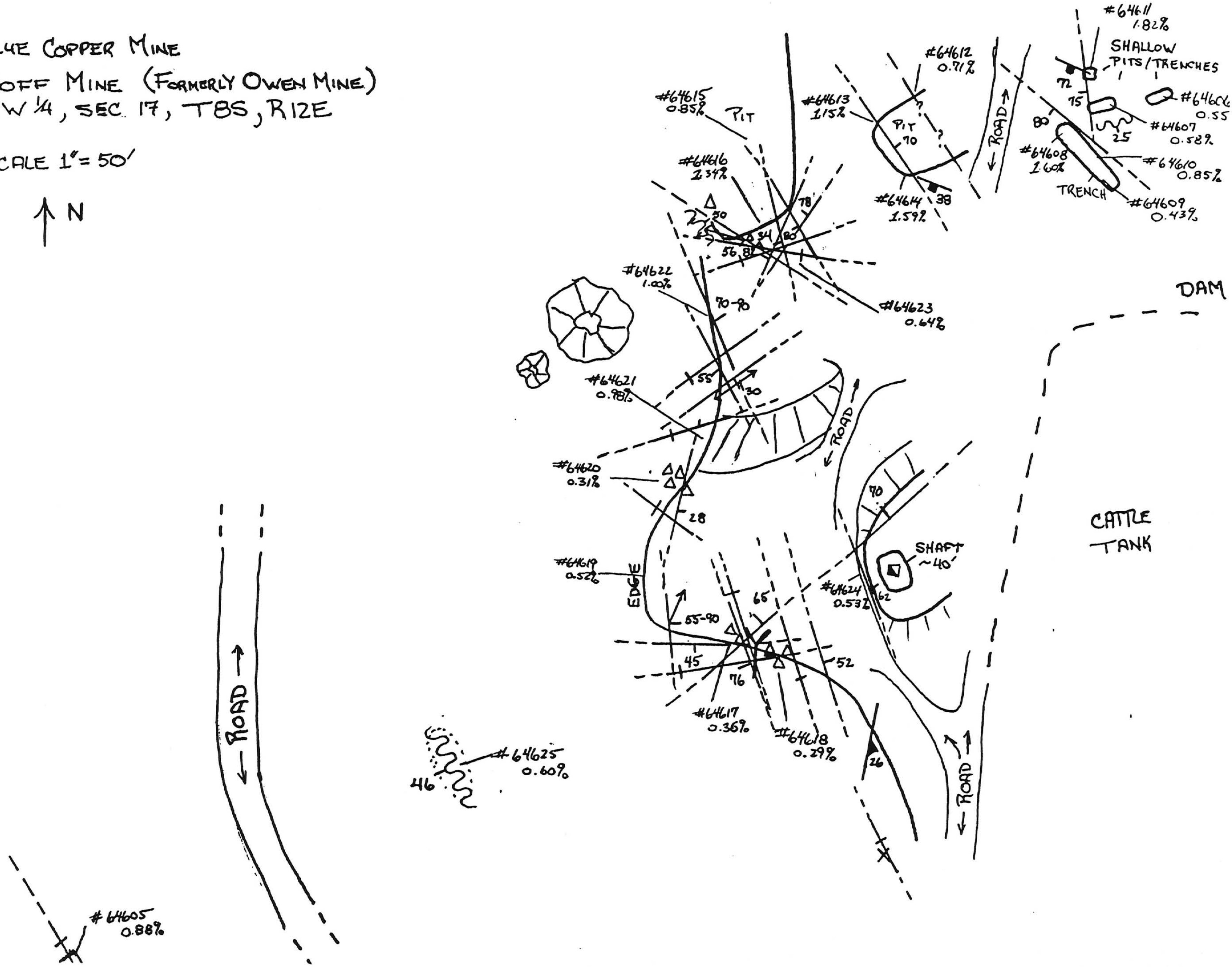
BLUE COPPER MINE

GOFF MINE (FORMERLY OWEN MINE)

SW 1/4, SEC. 17, T8S, R12E

SCALE 1" = 50'

↑ N



CROSS TRIANGLE
BURKHARDT CLAIMS
RATTLESNAKE HILL
NE1/4, SEC 19, T8S, R12E

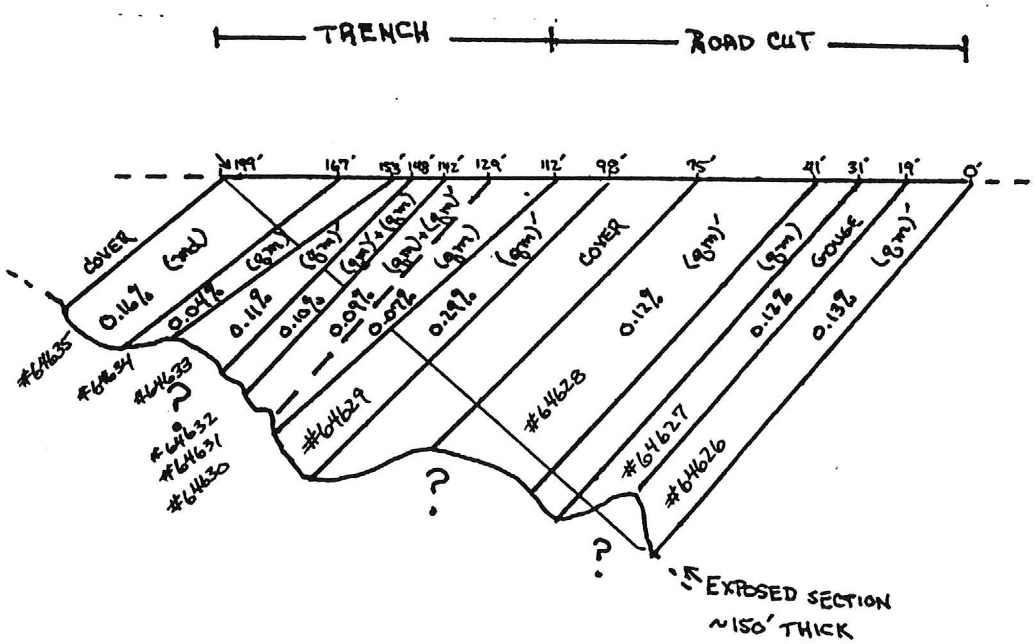
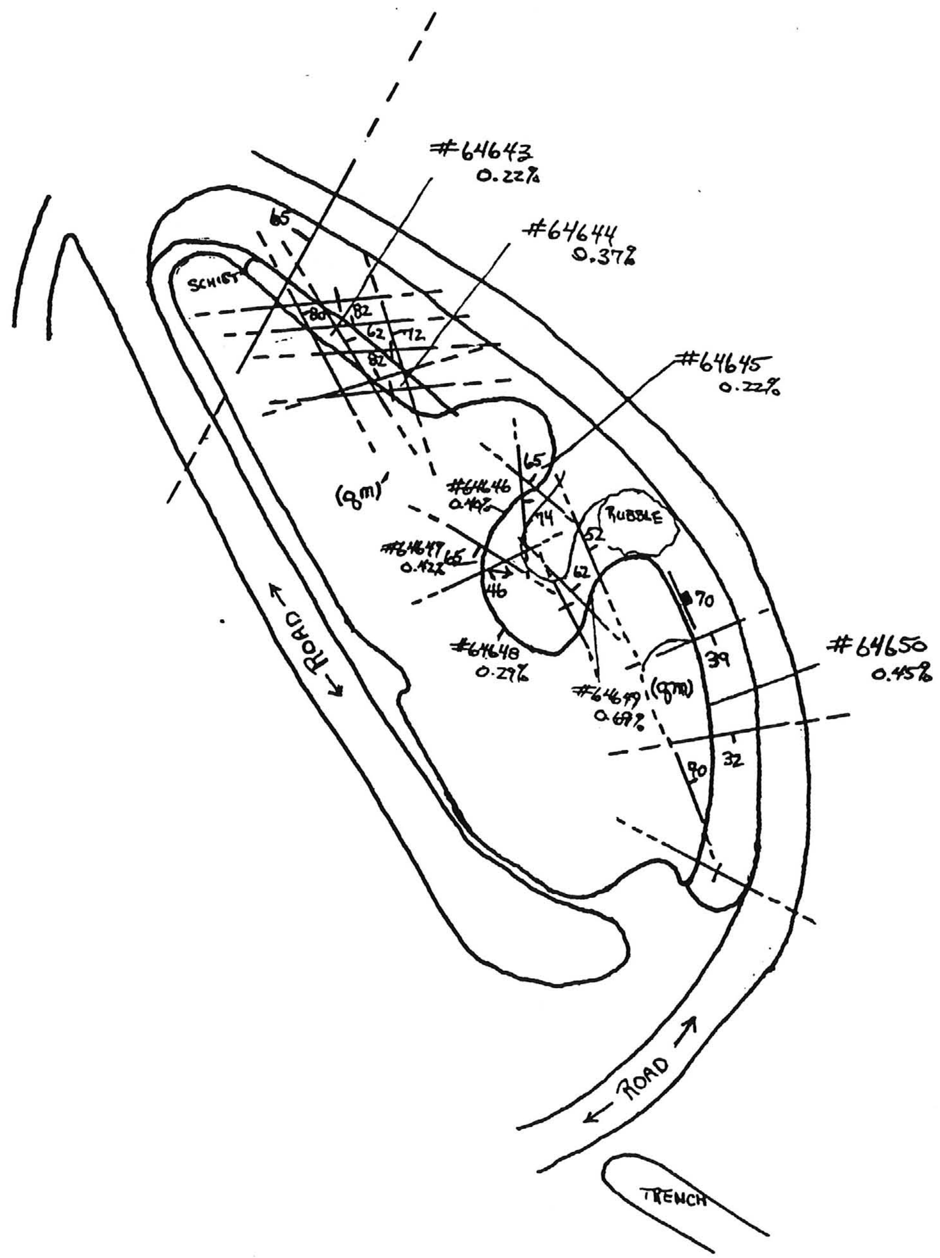


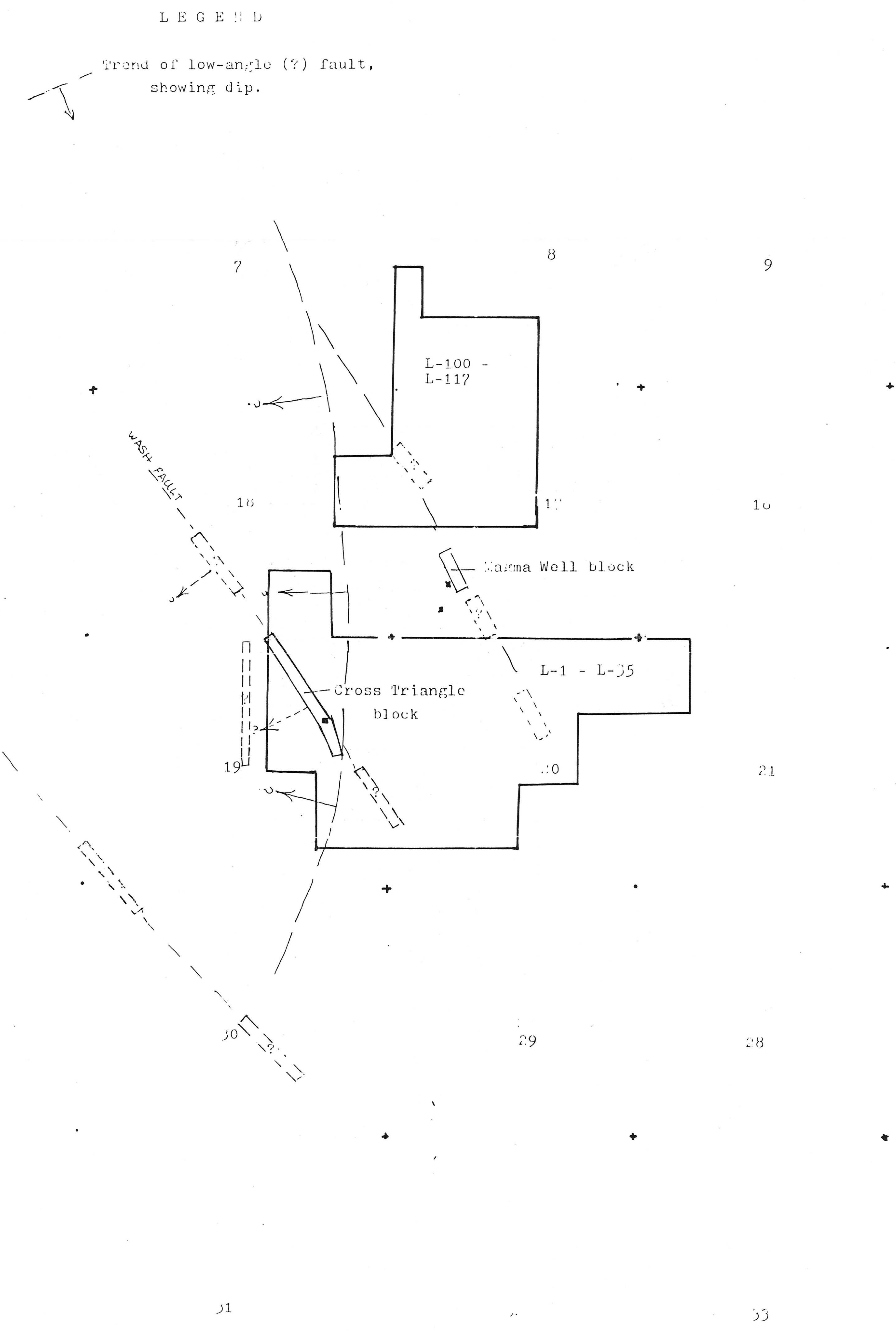
PLATE 3

CROSSTRIANGLE
BURKHARDT CLAIMS
SOUTH GREEN HILL MINE
NE¼, SEC 19, T8S, R12E

SCALE 1" = 50'

N




LEGEND
Trend of low-angle (?) fault, showing dip.
WASH FAULT
L-100 -
L-117
Magma Well block
L-1 - L-35
Cross Triangle
block
7
8
9
18
16
19
21
30
29
28
31
33

LEGEND

Qal - Alluvium

Ts - sediments
Tv - volanics
- microdiorite dikes and sills

Tgc - Catalina quartz monzonite

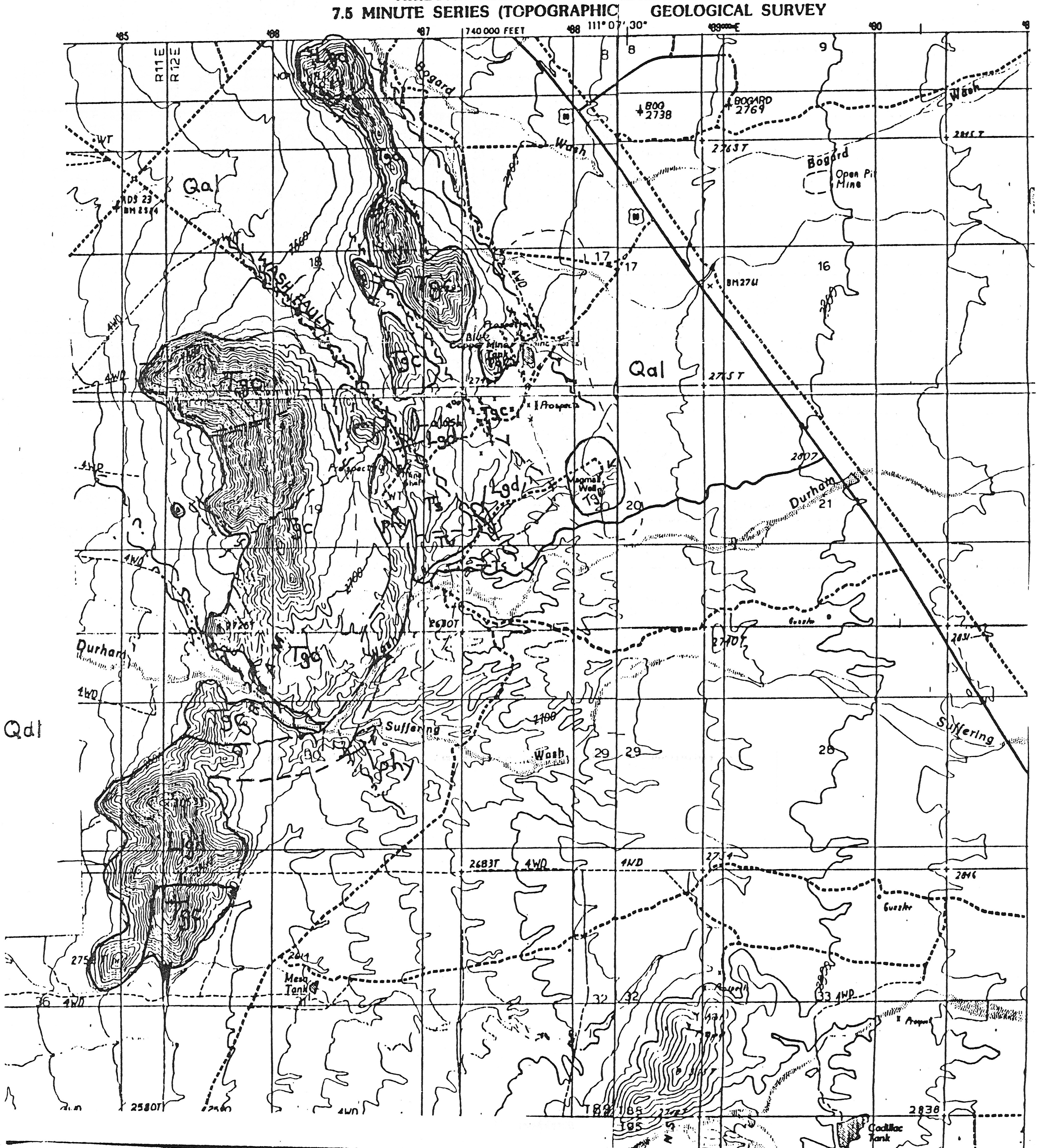
Lgd - Chirreon Wash granodiorite/quartz diorite

phy - schist/phyllonite (after pC Oracle quartz monzonite)

Other symbols as per convention.

DURHAM HILLS QUADRANGLE
ARIZONA–PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC

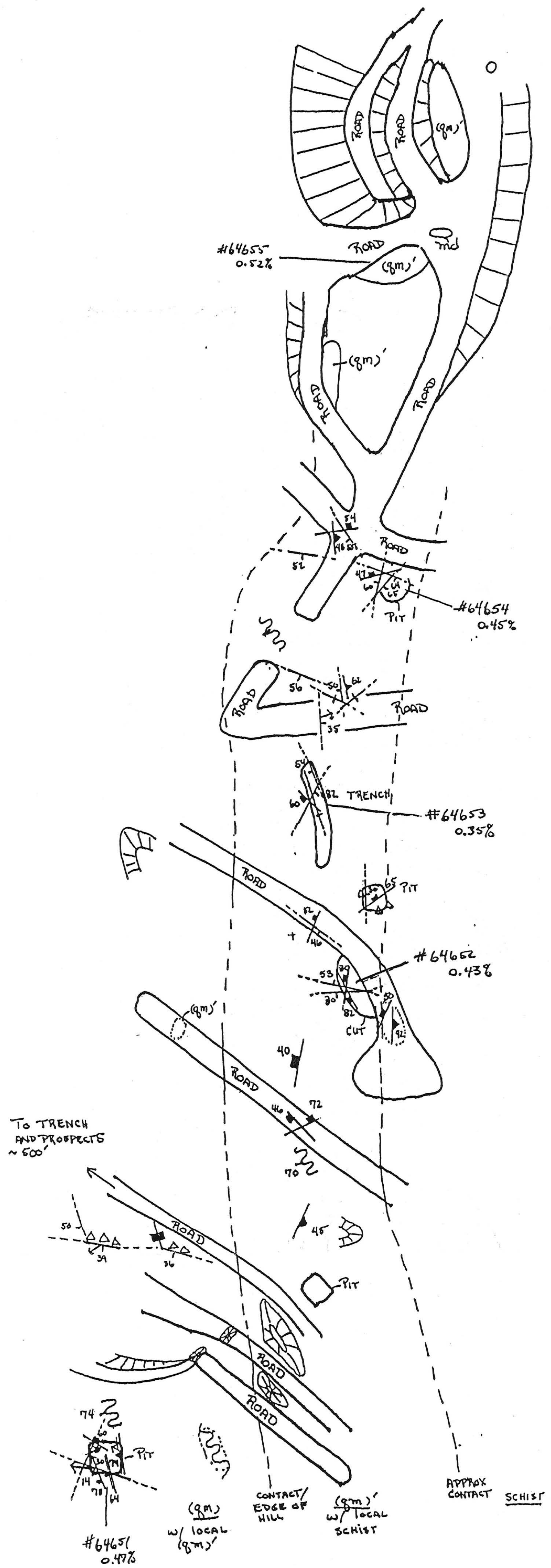
UNITED STATES
EPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



CROSSTRIANGLE
BURKHARDT CLAIMS
SOUTH BLUE HILL
NE 1/4, SEC 19, T8S, R12E

SCALE 1" = 50'

↑ N



WT

PLATE 5

EXPLANATION

Qal	Quaternary alluvium
Qoa	Quaternary older alluvium
Tsm	Tertiary San Manuel equivalent
Tcv	Tertiary Cloudburst volcanics
Tcs	Tertiary Cloudburst sediments
Tcsl	Tertiary Cloudburst landslide
(md)	sheared md
md	mafic dike
ap	aplite dike
myl	mylonitic schist
(qm)′	mineralized (qm)
(qm)	sheared qm
qm	quartz monzonite
(gd)	sheared gd
gd	granodiorite

55	STRIKE & DIP OF FOLIATION W/TREND OF LINEATION
40	STRIKE & DIP OF JOINT
80	STRIKE & DIP OF FAULT W/TREND OF SLICKENSIDES; BALL ON DOWNDROP BLOCK
65	STRIKE & DIP OF DETACHMENT (?) FAULT; HATCHURES ON UPPER PLATE
45	STRIKE & DIP OF SHEAR ZONE
	TREND OF LINEATION
	HORIZONTAL BEDDING
	CONTACT, DASHED WHERE APPROXIMATE
	OUTCROP CONTACT
	BRECCIATED ROCK
	QUARTZ VEIN
	PROSPECT
	SHAFT
	ADIT
	TRENCH
	DUMP