



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the Grover Heinrichs Mining Collection

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.

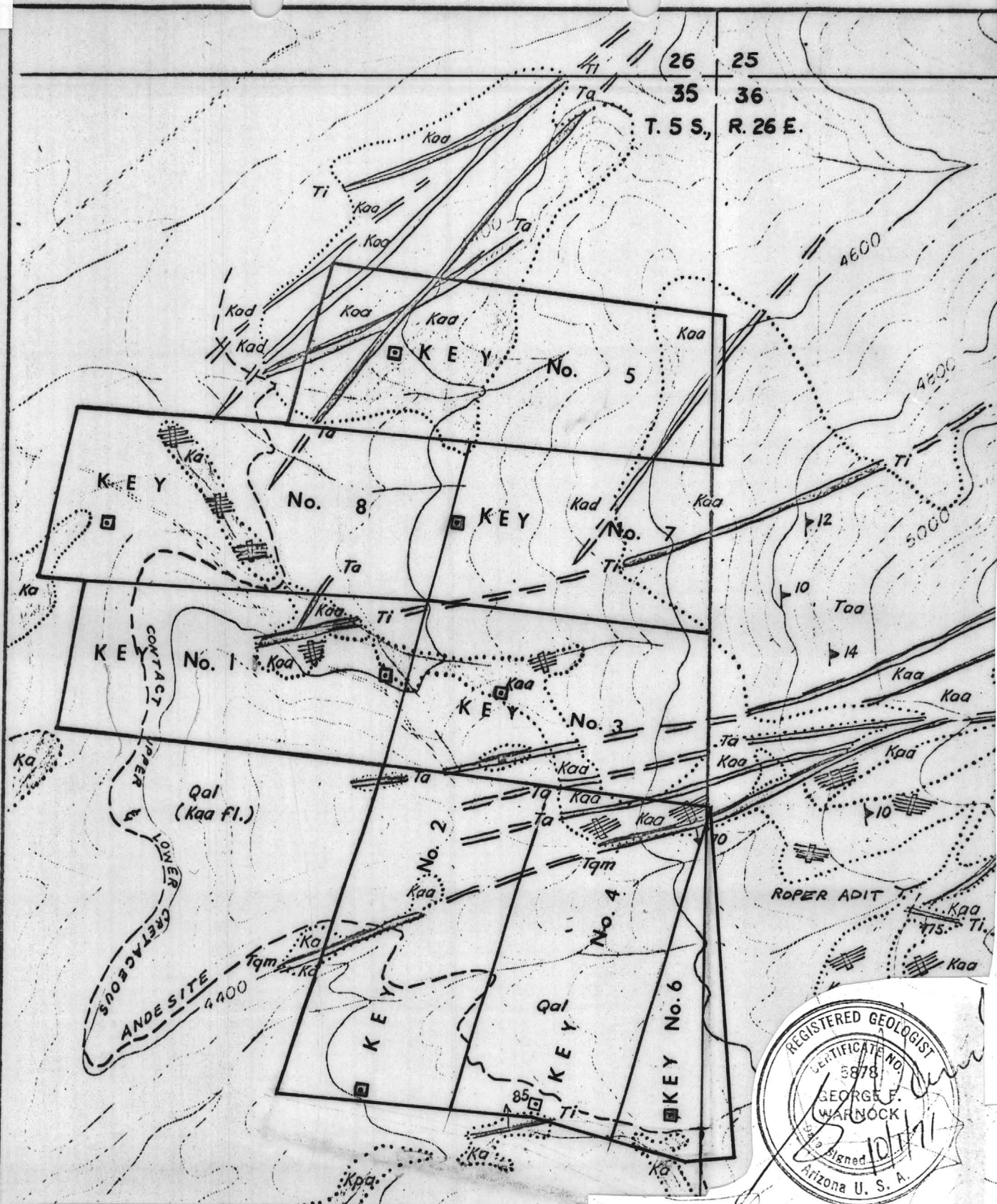
CONSTRAINTS STATEMENT

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.



□ indicates location monument

REVISED BY:

ESSEX

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

G. WARNOCK

ALBUQUERQUE, NEW MEXICO

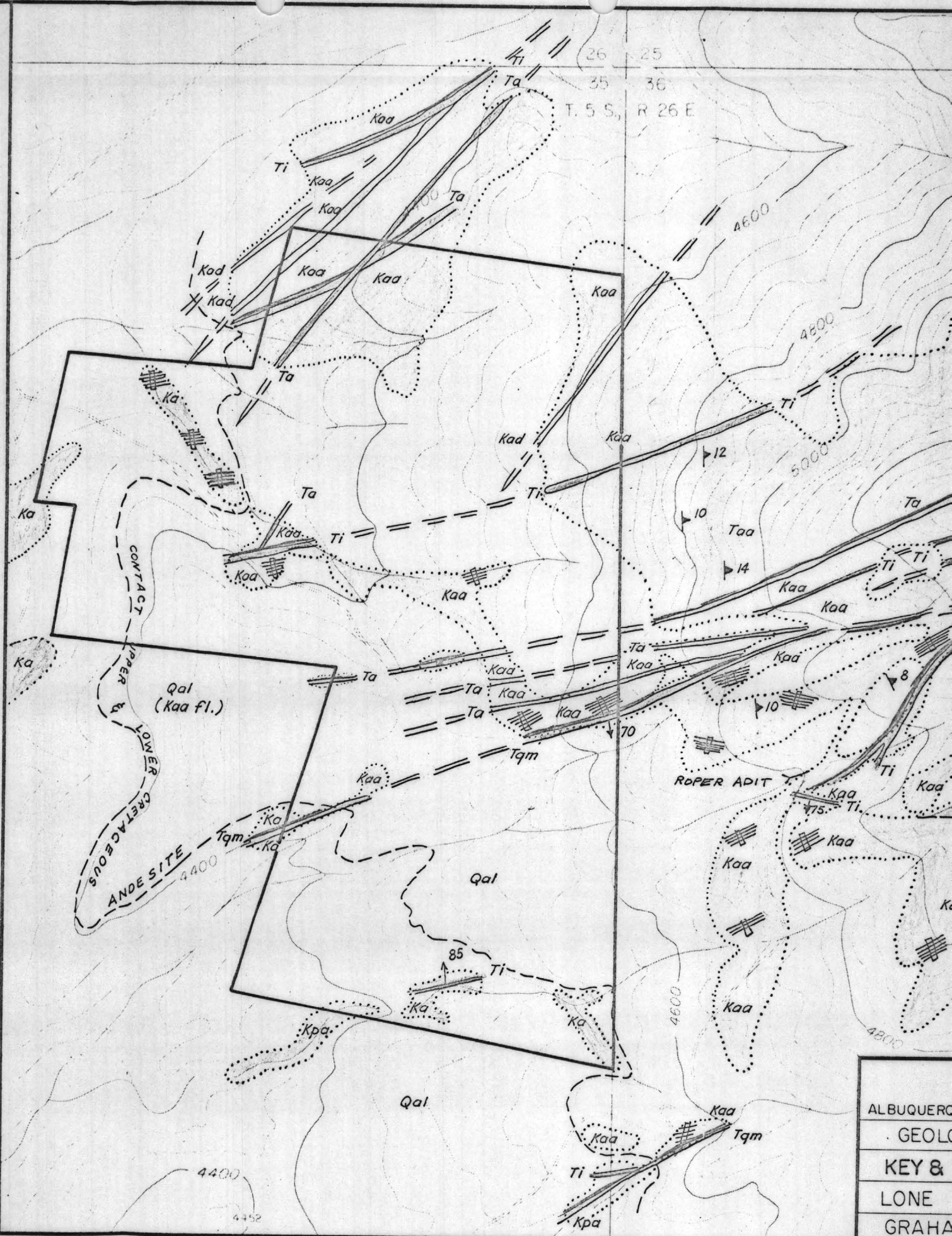
GEOLOGIC MAP OF THE

KEY CLAIM GROUP

LONE STAR MINING DISTRICT

GRAHAM COUNTY, ARIZONA

ite,

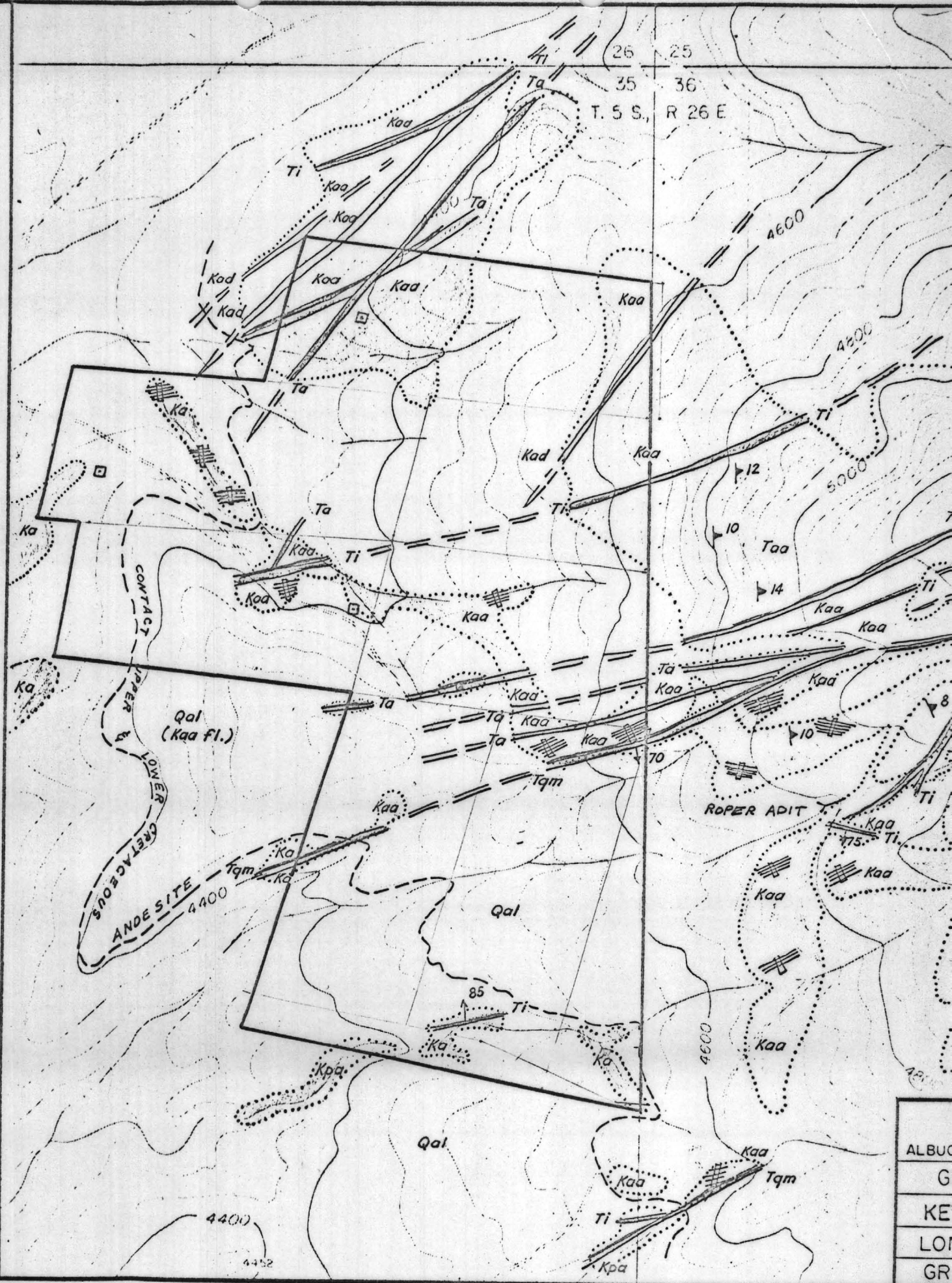


ALBUQUERQUE
GEOLOGICAL
KEY &
LONE
GRAHAM

andesite,

hantly

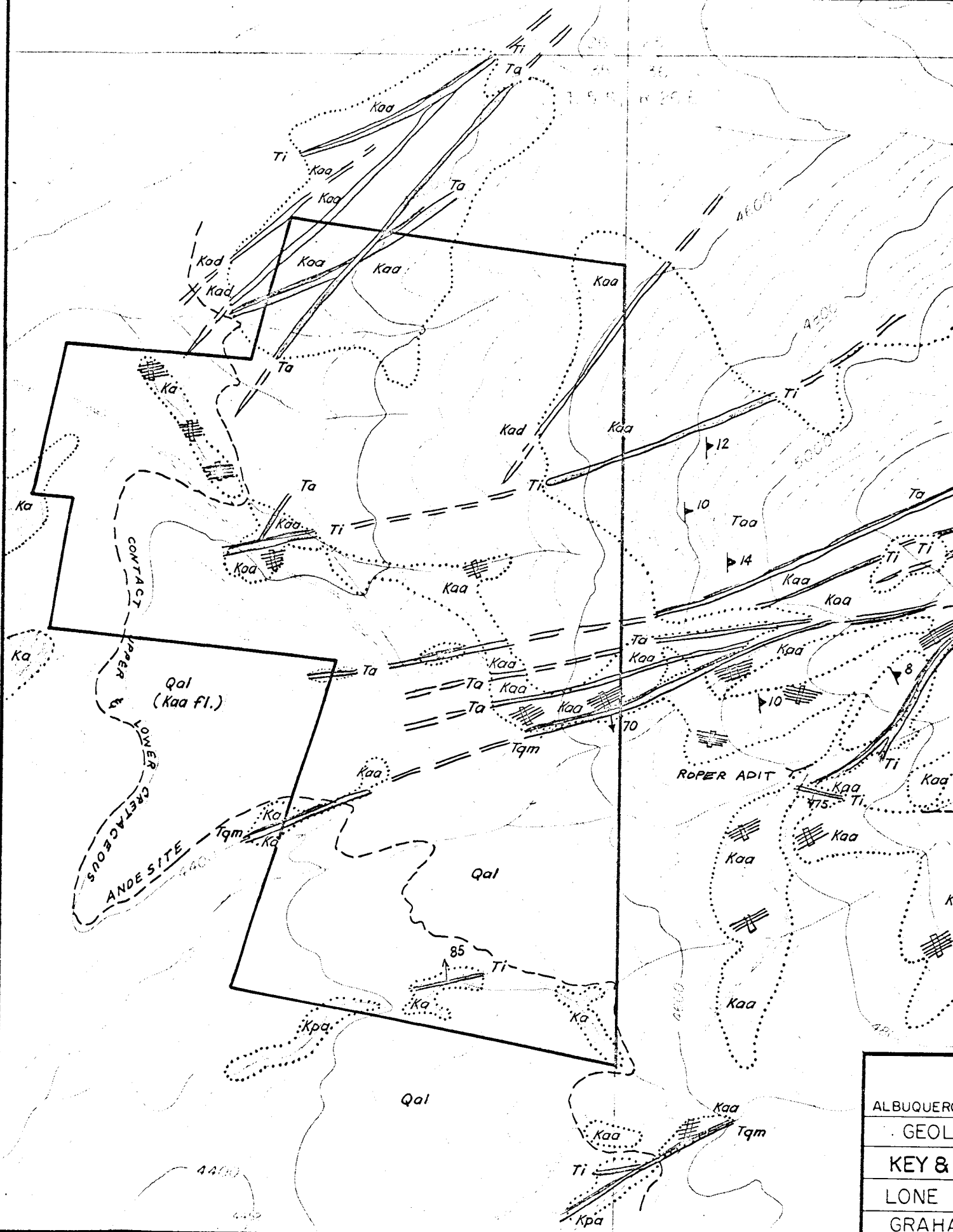
bles



ALBU
G
KE
LON
GR

site,

ly



ALBUQUERQUE
GEOL
KEY &
LONE
GRAHAM

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

The Ben Hur claims should be optioned with free time prior to the mapping as Kennecott and others appear to be watching Essex's actions closely. However, if free time cannot be had, I would map the Ben Hur area in detail prior to putting out front money.

SCOPE

Upon verbal agreement with Mr. Paul I. Eimon, Manager of Exploration, Essex International, Inc., Tucson, Arizona, 1.5 days were spent geologically mapping the Key & Keystone claim group from August 24 to 25, 1971. Additionally, three days were spent in office compilation and drafting of the geological map and report.

Emphasis was predominantly on detailed mapping of outcropping geology at a scale of 1" = 1,000' on air photos flown specifically for this job by Coopers Aerial Surveys of Tucson, Arizona. The geology was subsequently plotted at 1" = 500' to increase readability and presentation.

LOCATION & ACCESSIBILITY

The claims are located in the Lone Star Mining District approximately eleven miles northeast of Safford, Arizona. This is in Graham County in Township 5 south, Range 26 east, sections 35 and 36. Access is via the Safford Municipal Airport road to the San Juan road to jeep trails onto the claim block proper.

PROPERTY & OWNERSHIP

To allow the greatest possible distribution of the contracted time to be spent in geological mapping, no investigation of title to the claims was made. The location and configuration of the claims was supplied by Essex International,



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

Inc. and these also were not checked. Numerous claim posts were found in the field but no attempt was made to correlate these with legal description.

Based on Essex International, Inc's. property maps, there are ten claims comprising the group. These are the


- | | |
|--------------|-------|
| 1. Key | No. 1 |
| 2. Key | No. 2 |
| 3. Key | No. 3 |
| 4. Key | No. 4 |
| 5. Key | No. 5 |
| 6. Key | No. 6 |
| 7. Key | No. 7 |
| 8. Key | No. 8 |
| 9. Keystone | No. 1 |
| 10. Keystone | No. 2 |

all of which are contiguous.

HISTORY

Published data on the Lone Star Mining district indicates only the San Juan mine, located one mile southwest of the Key & Keystone claim group has had production to date. This was negligible up to recent development by Producer Minerals Company, Inc. who are currently producing cement copper from oxide ore.

Since 1956, both Kennecott Copper Corporation and Phelps Dodge Corporation have reportedly drilled out and developed low grade multimillion ton orebodies. The Kennecott Deposit is two miles southeast of the claim group and the Phelps Dodge orebody is two miles west of the claim block.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

PHYSICAL FEATURES

The claim area is on the southwest flank of the northwest trending Gila Mountains well above the pediment of this range which is deeply dissected by washes, commonly down to bed rock, creating rugged, local topography with major elevation differences in this local area.

The elevation on the claim group varies from 4,260 to 4,750 feet and climate and vegetation are typical Sonoran desert for these altitudes.

GENERAL GEOLOGY

The geology of the Lone Star District is based on published information by R. F. Robinson and Annan Cook compiled from mapping and research done for Kennecott Copper Corporation.

The Lone Star District is comprised of a thick sequence of Cretaceous andesitic volcanics intruded by small irregular masses and dikes of quartz diorite, granodiorite, quartz monzonite, dacite, andesite, quartz latite, latite and rhyolite with many variations of mineralogical content, fabric and texture.

This sequence is overlain unconformably by Tertiary volcanic flows consisting principally of basalt, dacite and andesite. A basal tuffaceous sandstone and conglomerate with distinct water worn grains and pebbles marks this unconformity throughout the district. The volcanic flows above the unconformity are all considered to be post mineral while those below are premineral.

Structurally, the northeast, Precambrian trend is predominant in the area. It controls most intrusives, both stock like and dikes along with mineralization and alteration. Strong shear zones conform to this direction as do a number of

B

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

offsetting faults. Generally, the northeast trending shear zones are confined to the lower Tertiary and older rocks below the premineral unconformity. However, a number of the northeast offsetting faults also offset both younger post mineral volcanics and northwest trending block faulting which in turn has offset the post mineral volcanics.

The second major structural trend is the northwest striking block faulting related to the development of the Basin & Range province in Southern Arizona. These faults offset all rocks in the area and in some cases have probably faulted only slightly consolidated gravels against premineral andesite. Most notable of the northwest trending faults is the Butte fault which generally separates the Gila Mountain Range from its pediment in this area.

Reportedly, mineralization in all known orebodies is found in the contact zones of intrusive rocks to andesite which are in turn controlled by the stronger northeast structural trend. Both pyrite and chalcopyrite mineralization are reported to decrease laterally along the shear zones from the centers of mineralization.

Halo alteration appears to also conform in intensity to the northeast trend, but varies in type with the rock type involved. Strong silicification and sericitization conform to acid and intermediary intrusive rocks in the zone of mineralization while the strong alteration of andesite is reportedly biotitization. These zones are followed along trend (northeast-southwest) by chloritized and propylized zones.

Most of the later intrusive dikes have narrow sericitized or chloritized zones accompanying them.

Epidote is the predominant mineral in the propylitic zone, so much so that the

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

rock commonly is simple epidotized rather than propylized. This epidotization appears to predominate in the upper agglomeritic flows of the Cretaceous andesite and may in fact be principally deuteric, only being redistributed where found on fractures.


CLAIM AREA GEOLOGY

The Key & Keystone group is located on and near the contact of an upper agglomeritic andesite and a lower non-agglomeritic andesite.

The upper unit is distinguished by its agglomeritic fabric. It crops out in the main portion of the claim group area. The upper unconformable contact is approximately 2,000 feet east of the claim group. It is approximately 1,000 feet thick in the claim area. Kennecott, however, has reported thickness of 2,700 feet for the unit. In the detailed mapping, the unit is designated as Cretaceous agglomeritic andesite (Kaa). Its only distinguishing feature megascopically from the lower unit is its agglomeritic fabric. Otherwise, they appear identical with a fine grain dense ground mass varying from green to dark blackish green depending on relative distribution of mafic minerals.

Either the upper or lower unit may be porphyritic, particularly near dikes and mineralized shears, where the andesite on occasion grades from porphyritic andesite to quartz monzonite of a fairly coarse grain fabric.

Additionally, the lower unit designated as Cretaceous andesite (Ka) in the detailed mapping has a porphyritic zone near its upper boundary that appears to be an original feature of the rock. This unit is designated Cretaceous porphyritic andesite (Kpa) in the mapping. However, the validity of this as a distinct flow is open to question. The distinction between it and the porphyritic fabric



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

developed by alteration near intrusives is strictly a question of field relationship.

An older, apparently premineral, set of andesitic dikes cut both the upper and lower andesites. They are in turn cut by the Tertiary quartz monzonite and all subsequent intrusive dikes. They are mapped as Cretaceous andesitic dikes (Kad) and are generally a denser, darker rock megascopically than the andesitic flows. They are very similar in the field to the basic Tertiary dikes (Ta), and unless field relationships indicate that the dike in question is pre-Tertiary (by being cut by Tertiary intrusives), it is mapped as a basic Tertiary intrusive (Ta) rather than the Cretaceous andesitic dike (Kad).


Quartz monzonite intrudes both andesite units as dikes and one small plug like occurrence approximately 2,000 feet east of the claim group.

This quartz monzonite contains decidedly less mafic minerals and tends to be coarser grained than the Lone Star quartz diorite stock some 5,000 feet south of the claims. The mineralized quartz monzonite dike cutting the east property line is even pegmatitic in places.

The later Tertiary dikes have been separated into two groups, acid to intermediary and basic.

The acid to intermediate group (Ti) consists of most of the common variations in this general category with a predominance for the acid end. Thus rhyolite and a white quartz latite predominate. Bull quartz dikes occur within the acid dikes and appear to be intruded rather than vein quartz although the latter also occurs.

The Tertiary acid dikes in two occasions form small pipes several hundred feet in diameter. These are both located some 2,000 feet east of the property and appear to be at the intersection of a N70-75°E and N45°E set of shears and subsequent dikes.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

Intense alteration of these pipes and the dikes around them make megascopic identification of the rock type tenuous, but they are probably white quartz latite.

The other type of Tertiary dike is basic andesite or dacite (Ta), the latter commonly with a few rounded, glassy quartz phenocrysts. No distinction has been made in age between the acid and basic varieties.

Structurally, the claim area is on the strike of the northeast trending San Juan shear zone in which the San Juan orebody is located some 5,000 feet southwest of the property.

This shear zone has two predominant trends, N70-75°E and N45°E. Dikes occupying both directions can be seen to intersect in some instances. Strong shearing in the upper agglomeritic andesite seems to favor the N70-75°E direction and may be so intense that individual shears will occur within inches of each other.

ALTERATION & MINERALIZATION

According to Kennecott, their orebody is contained in the lower Cretaceous andesite where intruded by swarms of Tertiary dikes. The lower andesite is thus a prime target in this area. It crops out only in the southwest portion of the claim block but no doubt underlies the whole area below the upper andesite.

In this area the lower andesite is thoroughly altered only where intruded by quartz monzonite and volcanic dikes. A few shears within the andesite are also mineralized with limonite, hematite and gouge. Relic pyrite casts are sometimes discernible.

Away from dikes or mineralization such as along the western border of the property, the andesite is only mildly altered. It contains the pervasive epidote

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982


KEY & KEYSTONE GROUP

development, although not to the degree of the upper andesite. It generally displays fine grained green to greenish black secondary chlorite. Much of this chlorite tinges on black but if any discernible green tint can be megascopically determined it is classed as chlorite rather than biotite alteration.

Some very minor fine grain distinctly black biotite is apparent in the lower andesite near mineralized dikes. However, not even these areas approach the degree of biotization described by Kennecott (10 to 50% of the rock). This leads to the inescapable conclusion that apart from the previously described dike and shear zones, the lower andesite where cropping out is relatively unaltered as compared with the reported alteration at the Kennecott and San Juan orebodies.

The quartz monzonite is only mildly altered by kaolinization, orthoclazation, and chloritization. The later intrusive dikes and mineralized shears commonly display thin (sometimes only a few inches) strong zones of silicification and sericitization along the margin of the dikes or shears. Stronger acid volcanic dikes severely alter the country rock 20-30 feet on either side of the dike. At the previously mentioned two quartz latite pipes some 2,000 feet east of the property, sericitization and silicification of the quartz latite has all but obscured the rock. This alteration and mineralization has formed a zone some 800 to 900 feet wide of quite intense alteration and mineralized shears. However, the upper agglomeritic andesite host in this area is strongly chlorized and propylized with no evident development of secondary biotite.

With the exception of the above mentioned occurrence, the upper agglomeritic andesite is only mildly altered by chloritization and propylization. It does, however, display a pervasive content of epidote, relatively much more than any other rock type in the area, including the lower andesite. The epidote is found



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

both on fractures and disseminated through the rock as both fine and coarse grained blebs. The preponderance of epidote in the upper agglomeritic andesite with apparently little control by later alteration or mineralization leads me to believe that it is probably deuteric. If so, it has been remobilized and redeposited on later fractures.

It is interesting to note that while the acid Tertiary dikes altered the upper andesite extensively, the quartz monzonite plug approximately 1,000 feet south of the volcanic plugs has only slightly altered the andesite within a few feet of the contact and is itself only mildly kaolinized and chloritized.


Two zones of mineralization are known east of the claim block, these are the Roper adit where a tunnel has been driven on a mineralized quartz latite dike and the Ben Hur property to the east which was not mapped.

EXPLORATION & DEVELOPMENT RECOMMENDED

The only serious alteration and mineralization in this area is at the two volcanic pipes some 2,000 feet east of the property line.

Away from this area, alteration is so mild or non-existent in the upper agglomeritic andesite as to indicate that the favorable lower andesite horizon, from 0 to 1,000 feet below outcrop, is also likely to be only mildly altered. At the eastern claim boundary, the upper andesite is only approximately 400 feet thick--this certainly is too thin a section to hide pervasive alteration at the top of the underlying lower andesite unit.

Of course, a yet deeper alteration and mineralization could exist under the claim area but based on the known orebody geology, it would have to be 4,000 to 6,000 feet deep not to show serious alteration at the surface.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

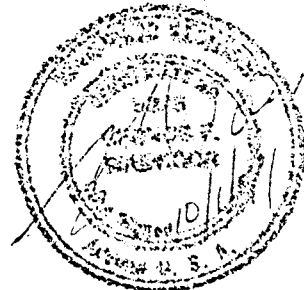
The area of the two volcanic pipes east of the claim block is considered worthy of further detailed work. This small intensely altered area of volcanic pipes and shear type mineralization occurs at the intersection of two northeast trending structural zones which contain known copper mineralization at the Roper adit (700 feet east of the eastern property line) and at the Ben Hur property some 2,500 feet east of the property line.

The volcanic pipes are clearly the center of a small mineralized altered area, and in fact, are on strike along the northeast trending San Juan shear zone. It is possible that this mineralized zone may be more extensive in the lower andesite which would be at least 1,000 feet deep at this locality.

Negative features are restricted size of the alteration zone, and its being restricted closely to the actual volcanic pipes and dikes.

It is recommended that the Ben Hur group be acquired on a free time option basis to give a contiguous block of claims with the Key and Keystone and Soto State lease. This should be followed by additional detailed mapping, particularly on the east slope of the ridge held up by the pipes toward the Ben Hur property, an area that was not covered in this project. If the mineralization and alteration can be shown to extend as far as the Ben Hur property, the area would be a serious target for a small porphyry type deposit at a depth of 1,000 to 2,000 feet, perhaps similar to the San Juan.

If the Ben Hur group cannot be obtained with free time, I would recommend the detailed mapping in any case--this to form a base for the decision to lay out front money for the group.



Key Claim Group

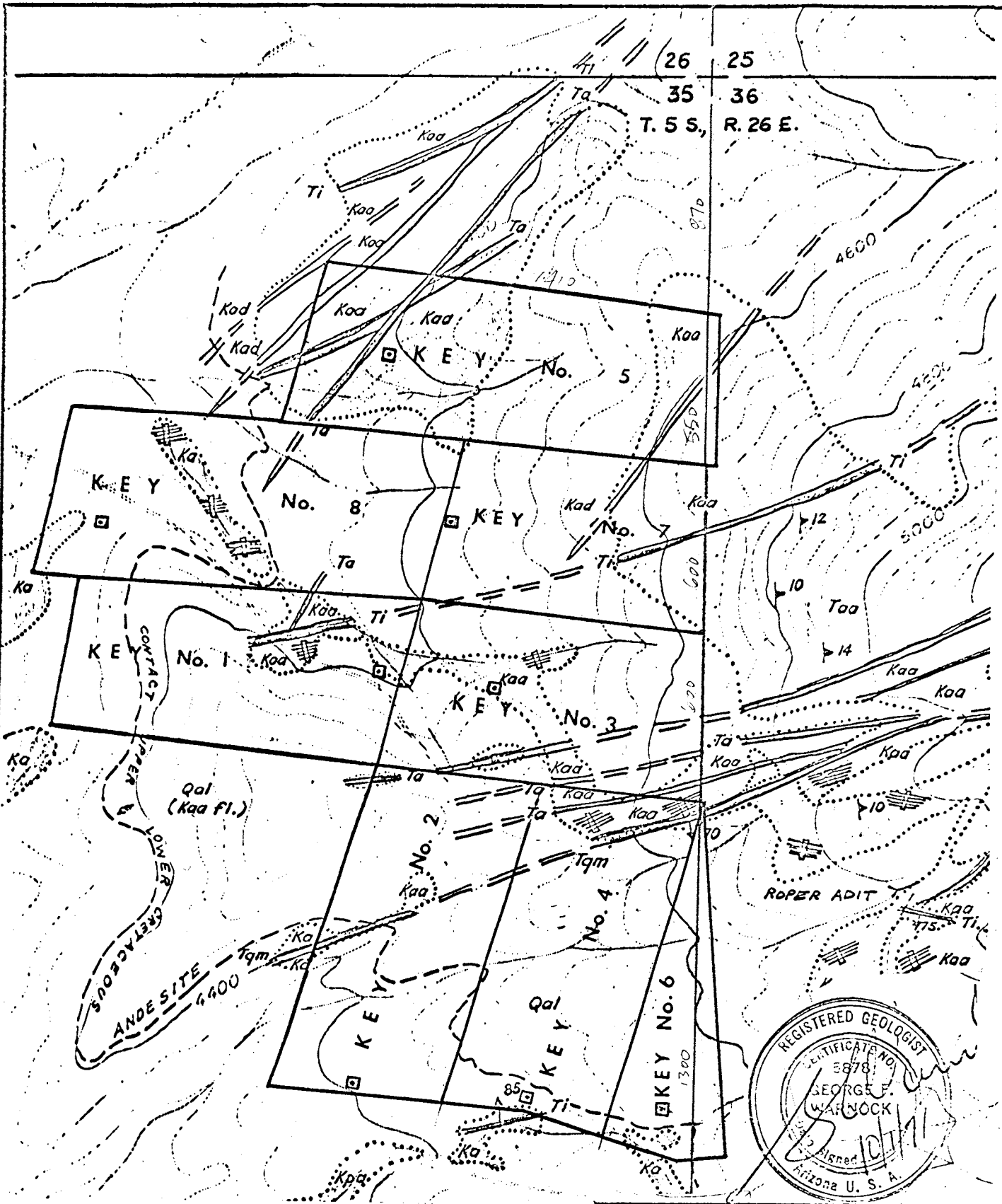
Approximately 60% of the Key claims is covered by recent unconsolidated and semi-consolidated gravels.

The oldest exposed rocks comprise the older volcanic series of Cretaceous(?) age and may be divided into two units; the lower fine-grained andesite porphyry flows and flow breccias, and the upper andesite agglomerate.

These older volcanic rocks are cut Tertiary dikes consisting of one large andesite dike ~~along the~~ trending north-south along the northeast border, and several smaller northeast trending dikes of dacite and rhyolite.

The upper agglomerate unit typically displays propylitic alteration. Biotite alteration was noted in outcrops of the lower andesite in the northwest portion of the claims and also in granodiorite obtained from an abandoned shaft in the center of the property. Quartz-sericite alteration with limonite and hematite is restricted to northeast trending fault-veins. The shaft was sunk on one of these veins where it contained appreciable.

The mineralization and alteration is typical of that known to be associated with copper deposits in the Safford.



□ indicates location monument

REVISED BY:

ESSEX

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

G. WARNOCK	
ALBUQUERQUE,	NEW MEXICO
GEOLOGIC MAP OF THE	
KEY CLAIM GROUP	
LONE STAR MINING DISTRICT	
GRAHAM COUNTY, ARIZONA	

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

E 5302 Tucson Copy
File No. 103-001-011

Report No. 71-5

Contract No.

Date October 1, 1971

KEY & KEYSTONE GROUP

SUMMARY, CONCLUSIONS & RECOMMENDATIONS


The Key & Keystone group of claims are occupied by a Cretaceous andesite which has been separated into an upper agglomeritic unit and a lower unit. The lower unit is the host to known copper mineralizations in this district.

The lower unit crops out through the southwest portion of the claims but is relatively unaltered and thus does not indicate porphyry copper type mineralization near surface in this area.

The overlying upper agglomeritic unit varies in thickness from 0 to 400 feet within the claim boundaries and obtains a thickness of 1,000 feet some 2,000 feet east of the claim block. It also is generally unaltered with the exception of a pervasive epidotization which is thought to be deuteric and one zone of intrusive volcanic pipes some 2,000 feet east of the property line that shows an intensely altered and somewhat mineralized area approximately 800 to 900 feet in diameter.

These pipe-like volcanic intrusives occur at the intersection of two different northeast trending structural zones which contain the Roper adit and Ben Hur mine mineralization. The area is considered favorable for a small porphyry copper type target to exist in depth in the lower andesite some 1,000 to 2,000 feet below outcrop.

It is recommended that detailed mapping of the area, particularly the east slope of the north-south ridge in this area--down to the Ben Hur mine, be continued. If alteration and mineralization continue as far as the Ben Hur property, the prospect would be judged worthy of follow up work, resulting ultimately in drilling of 2,000 foot holes if justified by the step by step work.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

The Ben Hur claims should be optioned with free time prior to the mapping as Kennecott and others appear to be watching Essex's actions closely. However, if free time cannot be had, I would map the Ben Hur area in detail prior to putting out front money.

SCOPE

Upon verbal agreement with Mr. Paul I. Eimon, Manager of Exploration, Essex International, Inc., Tucson, Arizona, 1.5 days were spent geologically mapping the Key & Keystone claim group from August 24 to 25, 1971. Additionally, three days were spent in office compilation and drafting of the geological map and report.

Emphasis was predominantly on detailed mapping of outcropping geology at a scale of 1" = 1,000' on air photos flown specifically for this job by Coopers Aerial Surveys of Tucson, Arizona. The geology was subsequently plotted at 1" = 500' to increase readability and presentation.

LOCATION & ACCESSIBILITY

The claims are located in the Lone Star Mining District approximately eleven miles northeast of Safford, Arizona. This is in Graham County in Township 5 south, Range 26 east, sections 35 and 36. Access is via the Safford Municipal Airport road to the San Juan road to jeep trails onto the claim block proper.

PROPERTY & OWNERSHIP

To allow the greatest possible distribution of the contracted time to be spent in geological mapping, no investigation of title to the claims was made. The location and configuration of the claims was supplied by Essex International,



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

Inc. and these also were not checked. Numerous claim posts were found in the field but no attempt was made to correlate these with legal description.

Based on Essex International, Inc's. property maps, there are ten claims comprising the group. These are the


- | | |
|--------------|-------|
| 1. Key | No. 1 |
| 2. Key | No. 2 |
| 3. Key | No. 3 |
| 4. Key | No. 4 |
| 5. Key | No. 5 |
| 6. Key | No. 6 |
| 7. Key | No. 7 |
| 8. Key | No. 8 |
| 9. Keystone | No. 1 |
| 10. Keystone | No. 2 |

all of which are contiguous.

HISTORY

Published data on the Lone Star Mining district indicates only the San Juan mine, located one mile southwest of the Key & Keystone claim group has had production to date. This was negligible up to recent development by Producer Minerals Company, Inc. who are currently producing cement copper from oxide ore.

Since 1956, both Kennecott Copper Corporation and Phelps Dodge Corporation have reportedly drilled out and developed low grade multimillion ton orebodies. The Kennecott Deposit is two miles southeast of the claim group and the Phelps Dodge orebody is two miles west of the claim block.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

PHYSICAL FEATURES

The claim area is on the southwest flank of the northwest trending Gila Mountains well above the pediment of this range which is deeply dissected by washes, commonly down to bed rock, creating rugged, local topography with major elevation differences in this local area.

The elevation on the claim group varies from 4,260 to 4,750 feet and climate and vegetation are typical Sonoran desert for these altitudes.

GENERAL GEOLOGY

The geology of the Lone Star District is based on published information by R. F. Robinson and Annan Cook compiled from mapping and research done for Kennecott Copper Corporation.

The Lone Star District is comprised of a thick sequence of Cretaceous andesitic volcanics intruded by small irregular masses and dikes of quartz diorite, granodiorite, quartz monzonite, dacite, andesite, quartz latite, latite and rhyolite with many variations of mineralogical content, fabric and texture.

This sequence is overlain unconformably by Tertiary volcanic flows consisting principally of basalt, dacite and andesite. A basal tuffaceous sandstone and conglomerate with distinct water worn grains and pebbles marks this unconformity throughout the district. The volcanic flows above the unconformity are all considered to be post mineral while those below are premineral.

Structurally, the northeast, Precambrian trend is predominant in the area. It controls most intrusives, both stock like and dikes along with mineralization and alteration. Strong shear zones conform to this direction as do a number of

B

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

offsetting faults. Generally, the northeast trending shear zones are confined to the lower Tertiary and older rocks below the premineral unconformity. However, a number of the northeast offsetting faults also offset both younger post mineral volcanics and northwest trending block faulting which in turn has offset the post mineral volcanics.

The second major structural trend is the northwest striking block faulting related to the development of the Basin & Range province in Southern Arizona. These faults offset all rocks in the area and in some cases have probably faulted only slightly consolidated gravels against premineral andesite. Most notable of the northwest trending faults is the Butte fault which generally separates the Gila Mountain Range from its pediment in this area.

Reportedly, mineralization in all known orebodies is found in the contact zones of intrusive rocks to andesite which are in turn controlled by the stronger northeast structural trend. Both pyrite and chalcopyrite mineralization are reported to decrease laterally along the shear zones from the centers of mineralization.

Halo alteration appears to also conform in intensity to the northeast trend, but varies in type with the rock type involved. Strong silicification and sericitization conform to acid and intermediary intrusive rocks in the zone of mineralization while the strong alteration of andesite is reportedly biotitization. These zones are followed along trend (northeast-southwest) by chloritized and propylized zones.

Most of the later intrusive dikes have narrow sericitized or chloritized zones accompanying them.

Epidote is the predominant mineral in the propylitic zone, so much so that the

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

rock commonly is simple epidotized rather than propylized. This epidotization appears to predominate in the upper agglomeritic flows of the Cretaceous andesite and may in fact be principally deuteric, only being redistributed where found on fractures.


CLAIM AREA GEOLOGY

The Key & Keystone group is located on and near the contact of an upper agglomeritic andesite and a lower non-agglomeritic andesite.

The upper unit is distinguished by its agglomeritic fabric. It crops out in the main portion of the claim group area. The upper unconformable contact is approximately 2,000 feet east of the claim group. It is approximately 1,000 feet thick in the claim area. Kennecott, however, has reported thickness of 2,700 feet for the unit. In the detailed mapping, the unit is designated as Cretaceous agglomeritic andesite (Kaa). Its only distinguishing feature megascopically from the lower unit is its agglomeritic fabric. Otherwise, they appear identical with a fine grain dense ground mass varying from green to dark blackish green depending on relative distribution of mafic minerals.

Either the upper or lower unit may be porphyritic, particularly near dikes and mineralized shears, where the andesite on occasion grades from porphyritic andesite to quartz monzonite of a fairly coarse grain fabric.

Additionally, the lower unit designated as Cretaceous andesite (Ka) in the detailed mapping has a porphyritic zone near its upper boundary that appears to be an original feature of the rock. This unit is designated Cretaceous porphyritic andesite (Kpa) in the mapping. However, the validity of this as a distinct flow is open to question. The distinction between it and the porphyritic fabric



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

developed by alteration near intrusives is strictly a question of field relationship.

An older, apparently premineral, set of andesitic dikes cut both the upper and lower andesites. They are in turn cut by the Tertiary quartz monzonite and all subsequent intrusive dikes. They are mapped as Cretaceous andesitic dikes (Kad) and are generally a denser, darker rock megascopically than the andesitic flows. They are very similar in the field to the basic Tertiary dikes (Ta), and unless field relationships indicate that the dike in question is pre-Tertiary (by being cut by Tertiary intrusives), it is mapped as a basic Tertiary intrusive (Ta) rather than the Cretaceous andesitic dike (Kad).


Quartz monzonite intrudes both andesite units as dikes and one small plug like occurrence approximately 2,000 feet east of the claim group.

This quartz monzonite contains decidedly less mafic minerals and tends to be coarser grained than the Lone Star quartz diorite stock some 5,000 feet south of the claims. The mineralized quartz monzonite dike cutting the east property line is even pegmatitic in places.

The later Tertiary dikes have been separated into two groups, acid to intermediary and basic.

The acid to intermediate group (Ti) consists of most of the common variations in this general category with a predominance for the acid end. Thus rhyolite and a white quartz latite predominate. Bull quartz dikes occur within the acid dikes and appear to be intruded rather than vein quartz although the latter also occurs.

The Tertiary acid dikes in two occasions form small pipes several hundred feet in diameter. These are both located some 2,000 feet east of the property and appear to be at the intersection of a N70-75°E and N45°E set of shears and subsequent dikes.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

Intense alteration of these pipes and the dikes around them make megascopic identification of the rock type tenuous, but they are probably white quartz latite.

The other type of Tertiary dike is basic andesite or dacite (Ta), the latter commonly with a few rounded, glassy quartz phenocrysts. No distinction has been made in age between the acid and basic varieties.

Structurally, the claim area is on the strike of the northeast trending San Juan shear zone in which the San Juan orebody is located some 5,000 feet southwest of the property.

This shear zone has two predominant trends, N70-75°E and N45°E. Dikes occupying both directions can be seen to intersect in some instances. Strong shearing in the upper agglomeritic andesite seems to favor the N70-75°E direction and may be so intense that individual shears will occur within inches of each other.

ALTERATION & MINERALIZATION

According to Kennecott, their orebody is contained in the lower Cretaceous andesite where intruded by swarms of Tertiary dikes. The lower andesite is thus a prime target in this area. It crops out only in the southwest portion of the claim block but no doubt underlies the whole area below the upper andesite.

In this area the lower andesite is thoroughly altered only where intruded by quartz monzonite and volcanic dikes. A few shears within the andesite are also mineralized with limonite, hematite and gouge. Relic pyrite casts are sometimes discernible.

Away from dikes or mineralization such as along the western border of the property, the andesite is only mildly altered. It contains the pervasive epidote

10

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982


KEY & KEYSTONE GROUP

development, although not to the degree of the upper andesite. It generally displays fine grained green to greenish black secondary chlorite. Much of this chlorite tinges on black but if any discernible green tint can be megascopically determined it is classed as chlorite rather than biotite alteration.

Some very minor fine grain distinctly black biotite is apparent in the lower andesite near mineralized dikes. However, not even these areas approach the degree of biotization described by Kennecott (10 to 50% of the rock). This leads to the inescapable conclusion that apart from the previously described dike and shear zones, the lower andesite where cropping out is relatively unaltered as compared with the reported alteration at the Kennecott and San Juan orebodies.

The quartz monzonite is only mildly altered by kaolinization, orthoclazation, and chloritization. The later intrusive dikes and mineralized shears commonly display thin (sometimes only a few inches) strong zones of silicification and sericitization along the margin of the dikes or shears. Stronger acid volcanic dikes severely alter the country rock 20-30 feet on either side of the dike. At the previously mentioned two quartz latite pipes some 2,000 feet east of the property, sericitization and silicification of the quartz latite has all but obscured the rock. This alteration and mineralization has formed a zone some 800 to 900 feet wide of quite intense alteration and mineralized shears. However, the upper agglomeritic andesite host in this area is strongly chlorized and propylized with no evident development of secondary biotite.

With the exception of the above mentioned occurrence, the upper agglomeritic andesite is only mildly altered by chloritization and propylization. It does, however, display a pervasive content of epidote, relatively much more than any other rock type in the area, including the lower andesite. The epidote is found



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

both on fractures and disseminated through the rock as both fine and coarse grained blebs. The preponderance of epidote in the upper agglomeritic andesite with apparently little control by later alteration or mineralization leads me to believe that it is probably deuteric. If so, it has been remobilized and redeposited on later fractures.

It is interesting to note that while the acid Tertiary dikes altered the upper andesite extensively, the quartz monzonite plug approximately 1,000 feet south of the volcanic plugs has only slightly altered the andesite within a few feet of the contact and is itself only mildly kaolinized and chloritized.


Two zones of mineralization are known east of the claim block, these are the Roper adit where a tunnel has been driven on a mineralized quartz latite dike and the Ben Hur property to the east which was not mapped.

EXPLORATION & DEVELOPMENT RECOMMENDED

The only serious alteration and mineralization in this area is at the two volcanic pipes some 2,000 feet east of the property line.

Away from this area, alteration is so mild or non-existent in the upper agglomeritic andesite as to indicate that the favorable lower andesite horizon, from 0 to 1,000 feet below outcrop, is also likely to be only mildly altered. At the eastern claim boundary, the upper andesite is only approximately 400 feet thick--this certainly is too thin a section to hide pervasive alteration at the top of the underlying lower andesite unit.

Of course, a yet deeper alteration and mineralization could exist under the claim area but based on the known orebody geology, it would have to be 4,000 to 6,000 feet deep not to show serious alteration at the surface.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

KEY & KEYSTONE GROUP

The area of the two volcanic pipes east of the claim block is considered worthy of further detailed work. This small intensely altered area of volcanic pipes and shear type mineralization occurs at the intersection of two northeast trending structural zones which contain known copper mineralization at the Roper adit (700 feet east of the eastern property line) and at the Ben Hur property some 2,500 feet east of the property line.

The volcanic pipes are clearly the center of a small mineralized altered area, and in fact, are on strike along the northeast trending San Juan shear zone. It is possible that this mineralized zone may be more extensive in the lower andesite which would be at least 1,000 feet deep at this locality.

Negative features are restricted size of the alteration zone, and its being restricted closely to the actual volcanic pipes and dikes.

It is recommended that the Ben Hur group be acquired on a free time option basis to give a contiguous block of claims with the Key and Keystone and Soto State lease. This should be followed by additional detailed mapping, particularly on the east slope of the ridge held up by the pipes toward the Ben Hur property, an area that was not covered in this project. If the mineralization and alteration can be shown to extend as far as the Ben Hur property, the area would be a serious target for a small porphyry type deposit at a depth of 1,000 to 2,000 feet, perhaps similar to the San Juan.

If the Ben Hur group cannot be obtained with free time, I would recommend the detailed mapping in any case--this to form a base for the decision to lay out front money for the group.



Qa1	(Tqd. fl.)	(Ka. fl.)	(Kaa. fl.)
-----	------------	-----------	------------

(Tqd. fl.) predominantly Tertiary quartz
diorite float

(Ka. fl.) predominantly lower Cretaceous andesite float.

(Kaa. fl.) predominantly upper Cretaceous andesite float.

Tbb Tbb, basal tuffaceous sandstone and conglomerate. Forms marker bed at unconformity on older Cretaceous volcanics.

Ti, rhyolite, latite and quartz latite dikes. Tb, basalt flow with some andesite, dacite and tuff.

Td. andesite and dacite.

Tqm, quartz monzonite

Tad, quartz diorite.

Kad, andesite dikes intruding the Cretaceous section but intruded by Tertiary.

Kaa, upper andesite predominantly agglomerate.

Ka, lower andesite

Kpa, lower porphyritic.

Contact, dashed where indefinite or inferred

Fault, dashed where indefinite or inferred

Strike & dip of beds

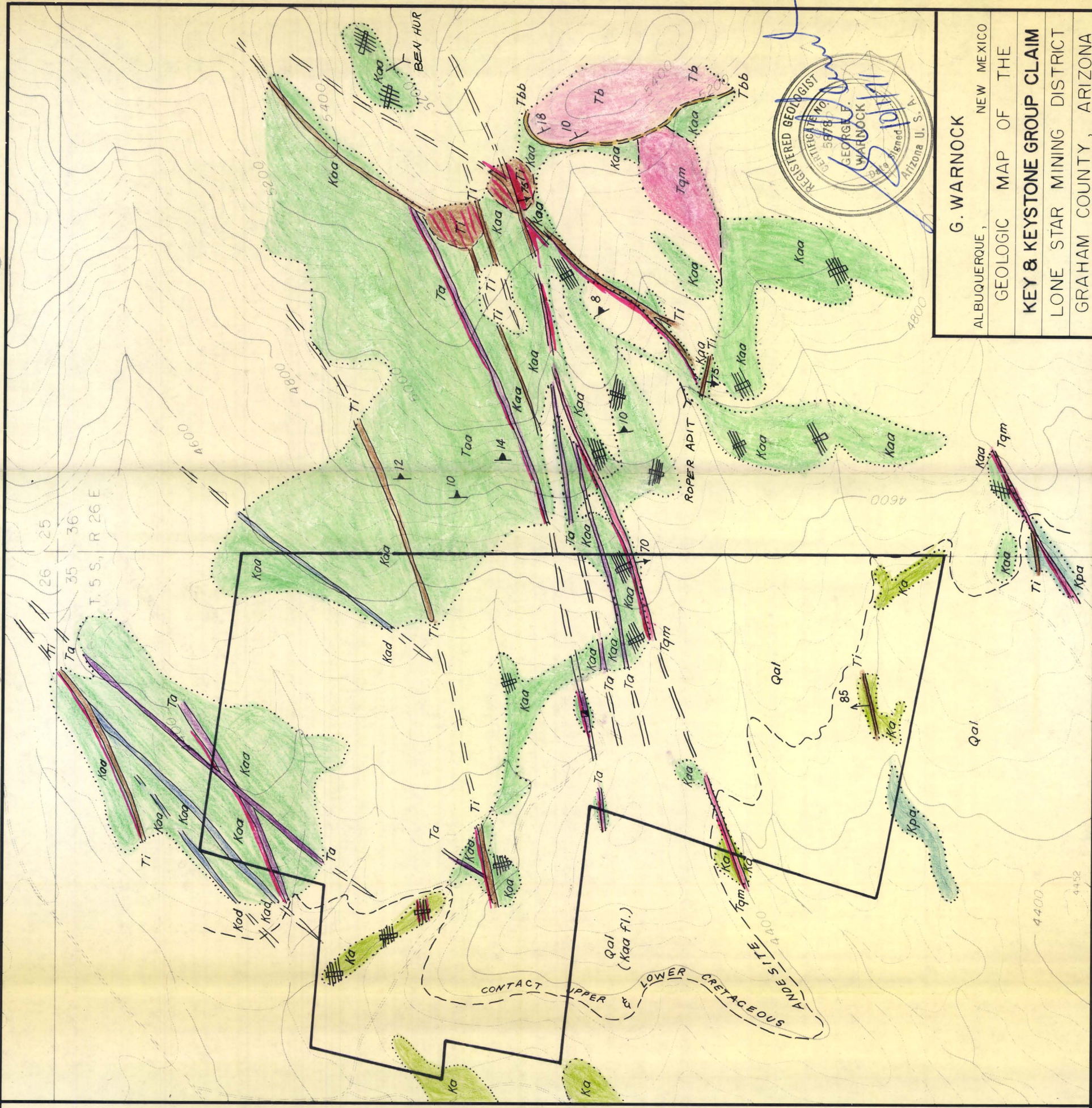
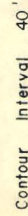
Strike & dip of flow layers

Strike & dip of joint & shear zones

Veins mineralized with limonite after sulfides (predominantly pyrite) and hematite. Cu denotes some minor chrysocolla

Outcrop boundary

Topographical base, USGS advance sheet,
Safford NW, Graham County,
Arizona, 1:24,000



G. WARNOCK

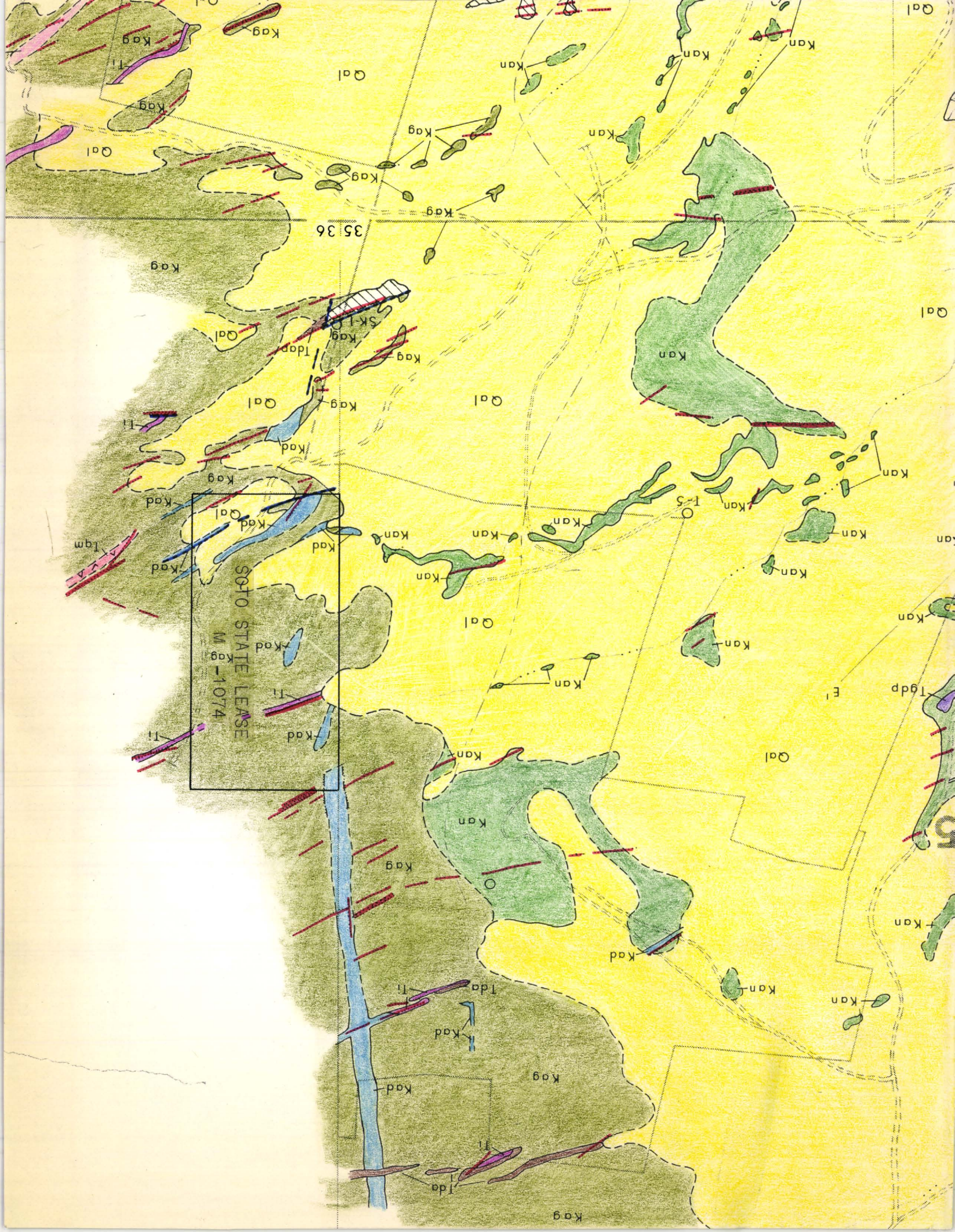
ALBUQUERQUE, NEW MEXICO

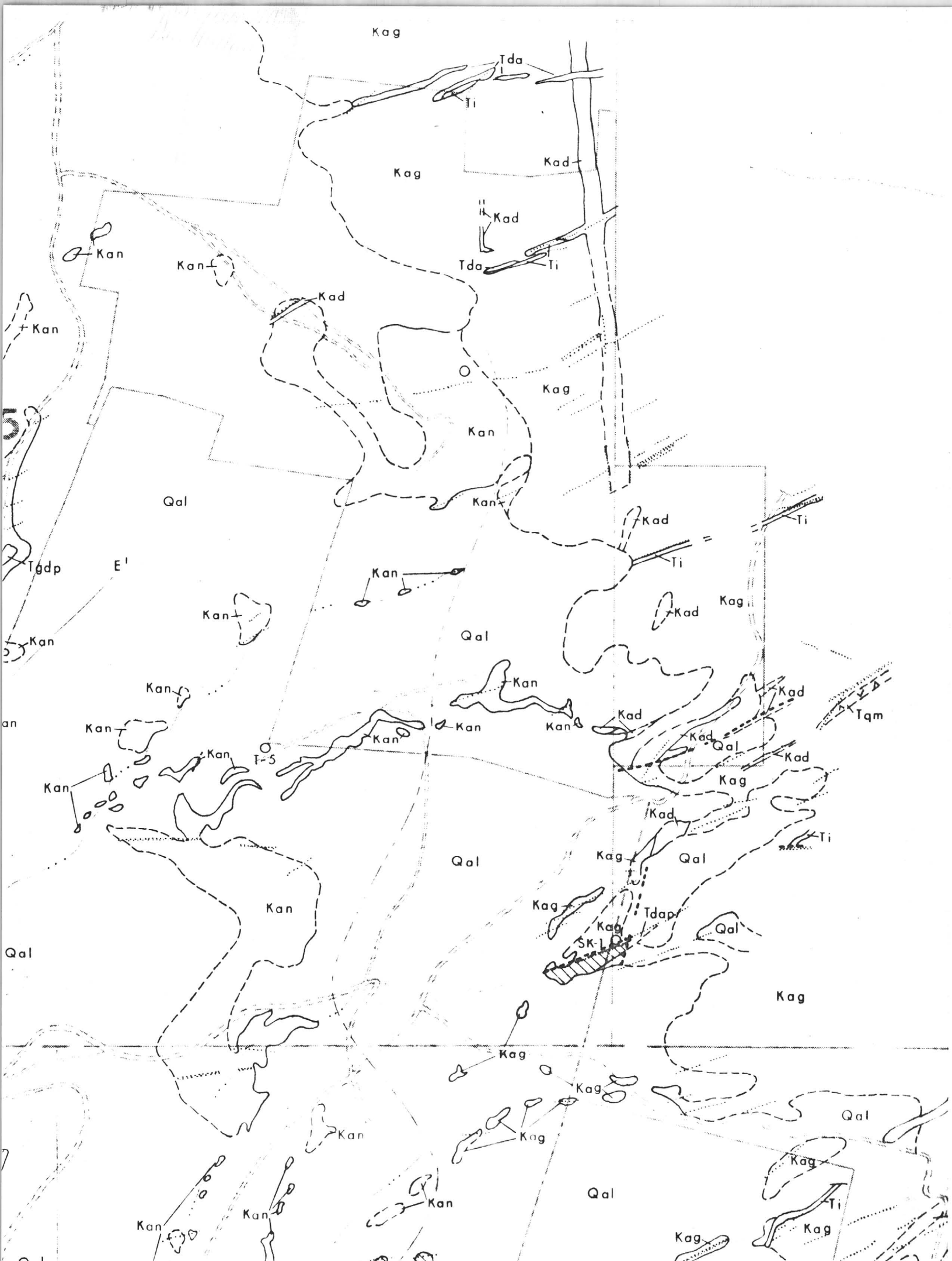
GEOLOGIC MAP OF THE

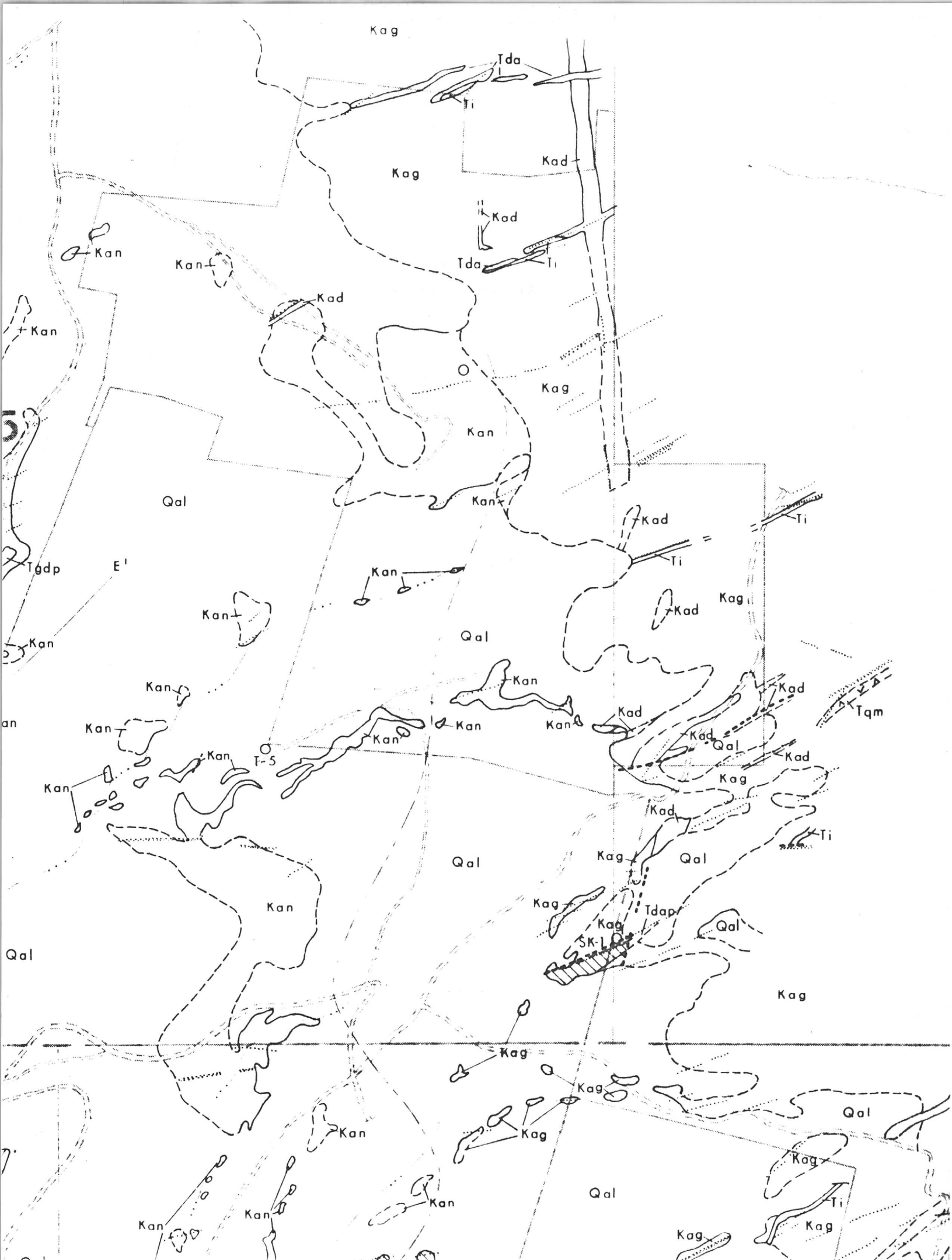
KEY & KEYSTONE GROUP CLAIM

LONE STAR MINING DISTRICT

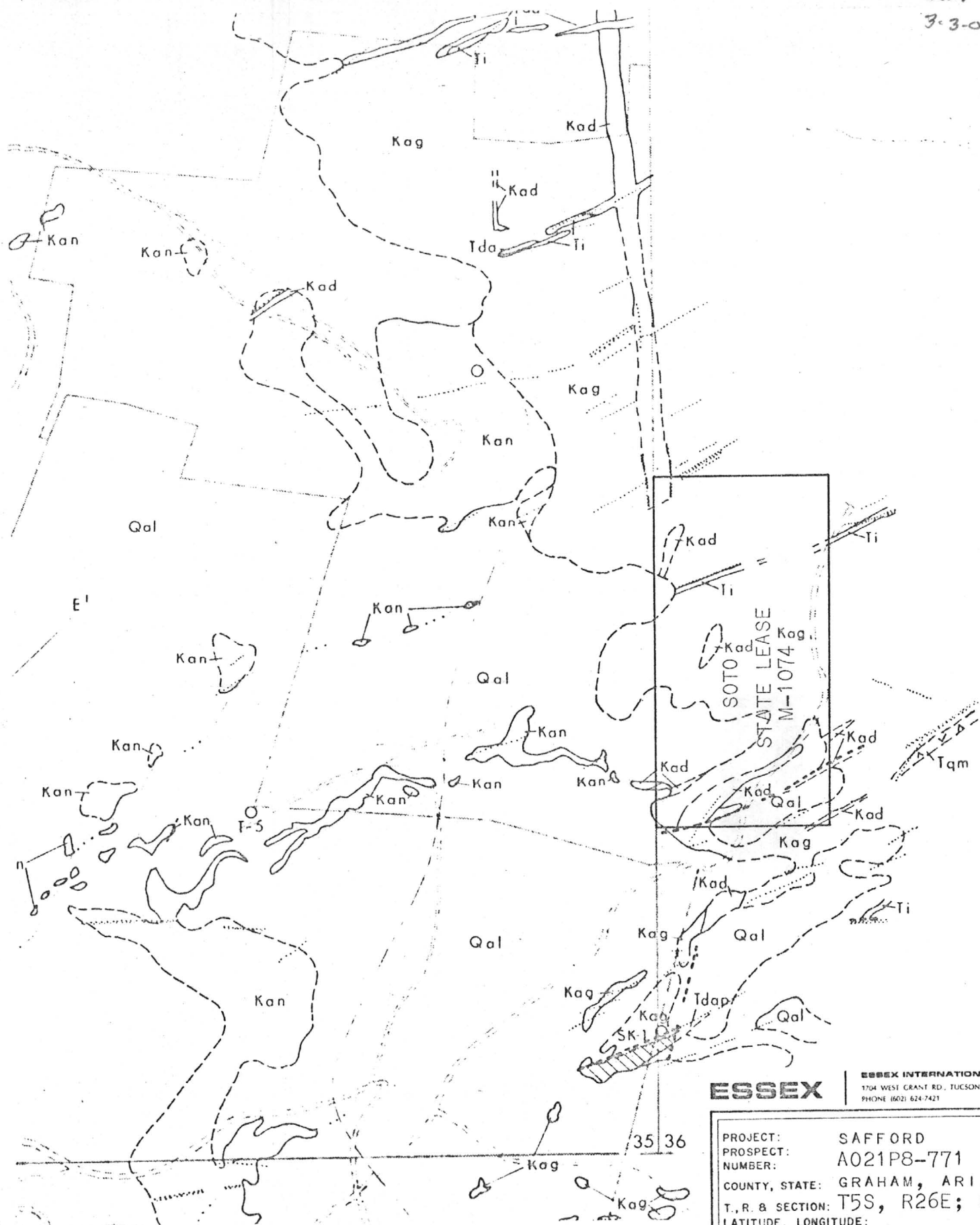
GRAHAM COUNTY, ARIZONA







QAP
3-3-03



ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

PROJECT: SAFFORD
PROSPECT: A021P8-771
NUMBER:
COUNTY, STATE: GRAHAM, ARIZONA
T., R. & SECTION: T5S, R26E; S36
LATITUDE, LONGITUDE:

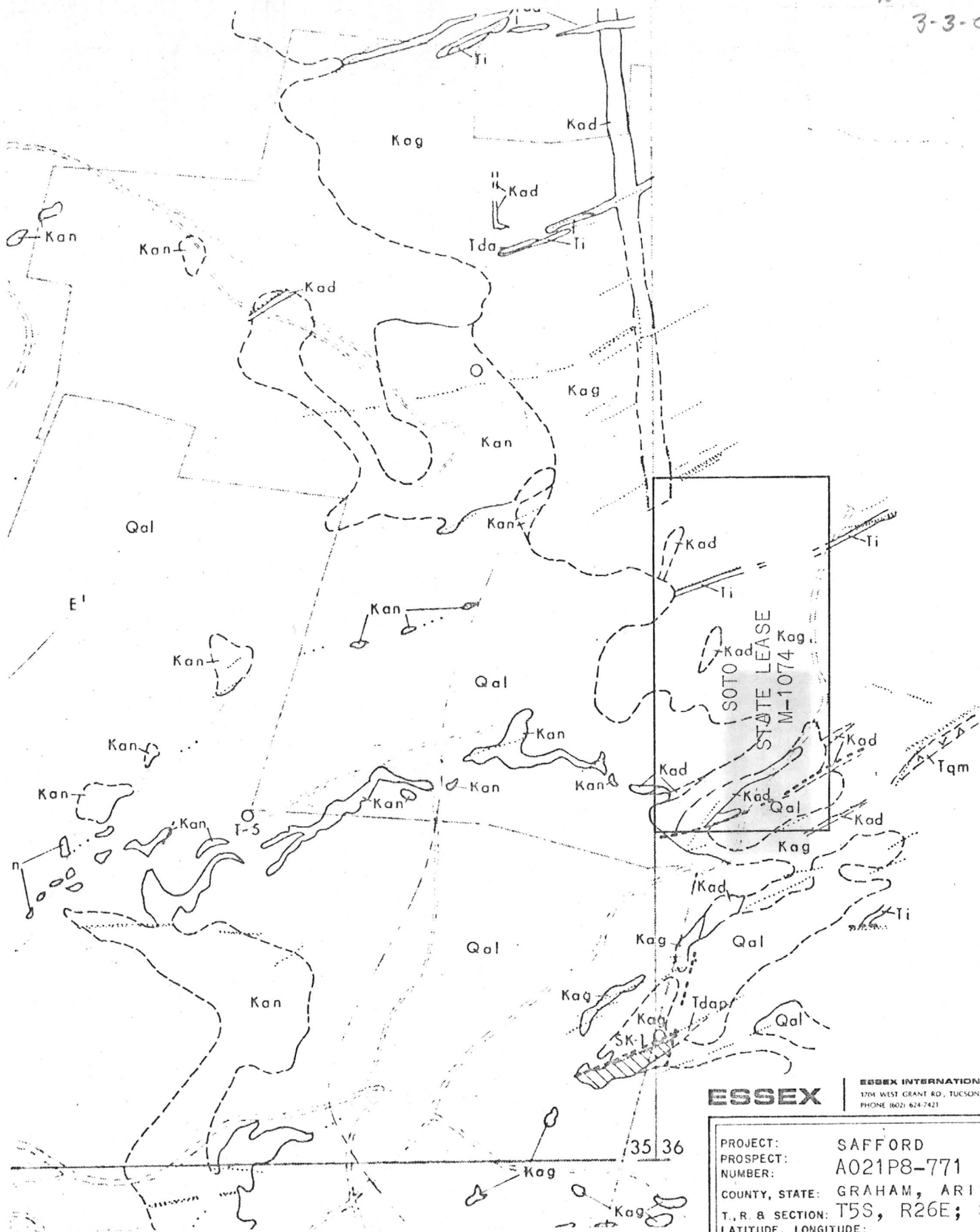
GEOLOGY MAP

SCALE: 1" = 500'
DATE: 12/12/72
DATA BY: B. HELMING
PREPARED BY: ATC

FOR ASSESSMENT YEAR 1971/1972

SOTO STATE LEASE M-1074

Dup
3-3-03



ESSEX | **ESSEX INTERNATIONAL, INC.**
3704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

PROJECT: SAFFORD
PROSPECT: A021P8-771
NUMBER:
COUNTY, STATE: GRAHAM, ARIZONA
T., R. & SECTION: T5S, R26E; S36
LATITUDE, LONGITUDE:

GEOLOGY MAP

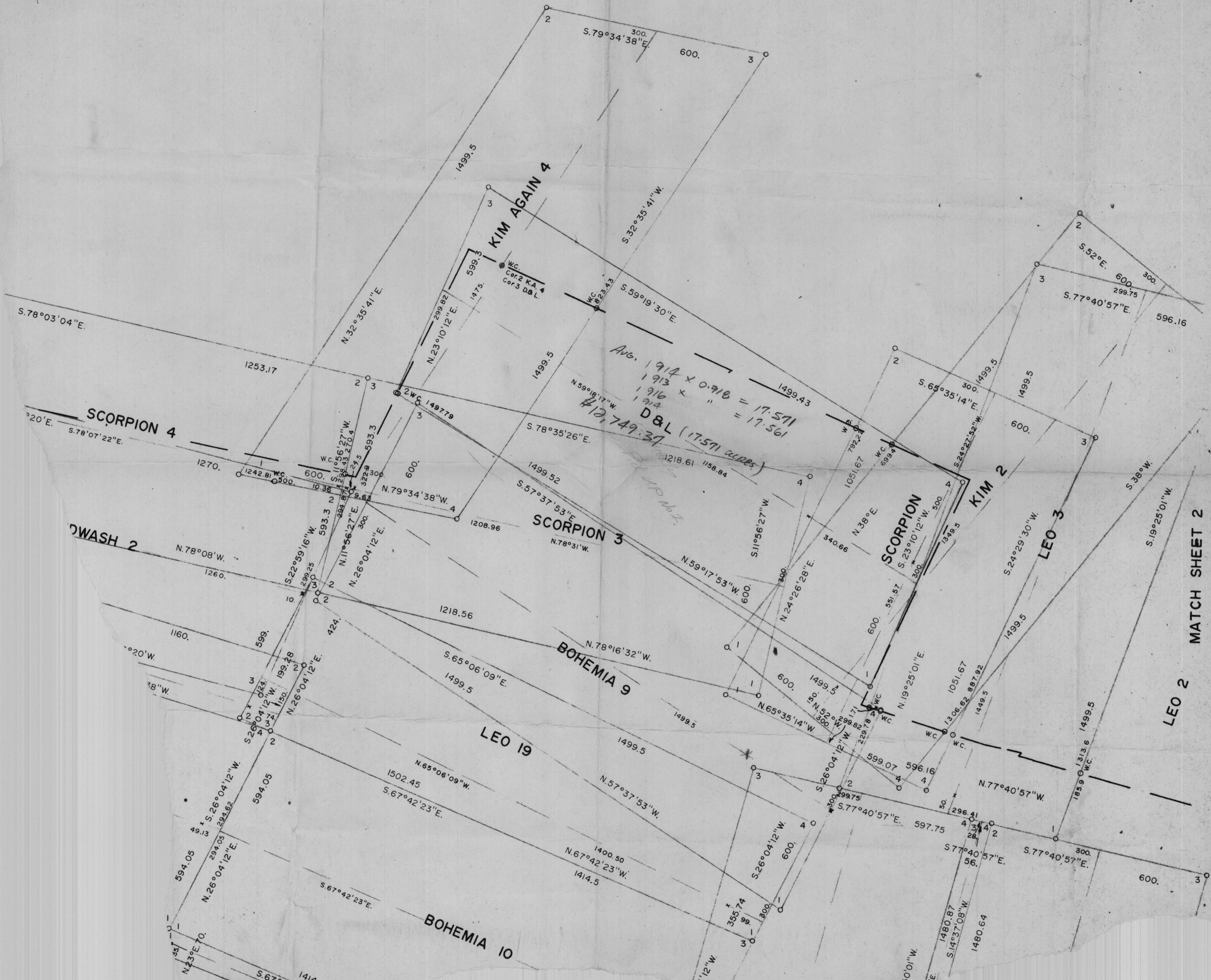
SCALE: 1" = 500'
DATE: 12/12/72
DATA BY: B. HELMING
PREPARED BY: ATC

FOR ASSESSMENT YEAR 1971/1972

SOTO STATE LEASE M-1074

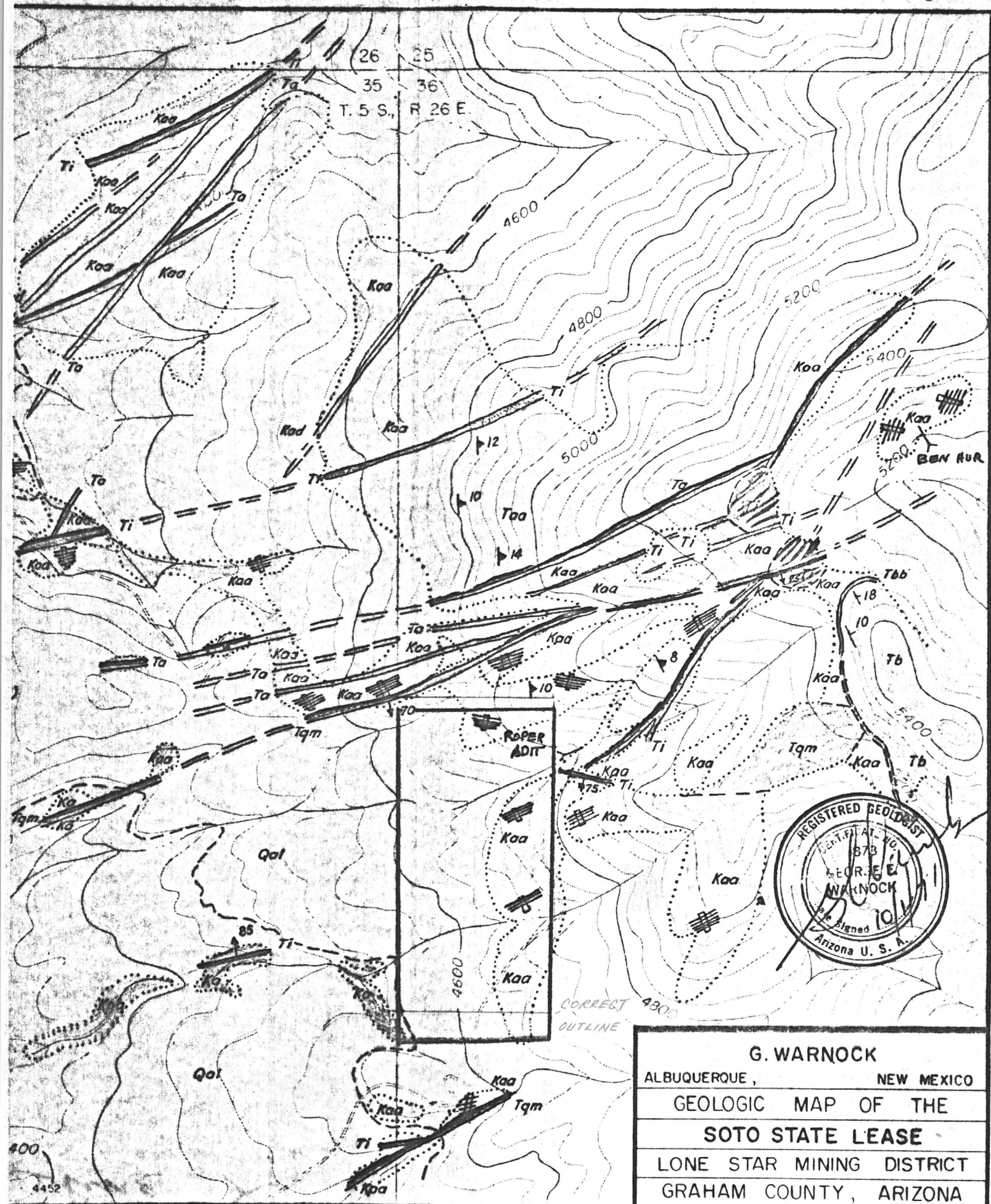
Sheet 2 of 3

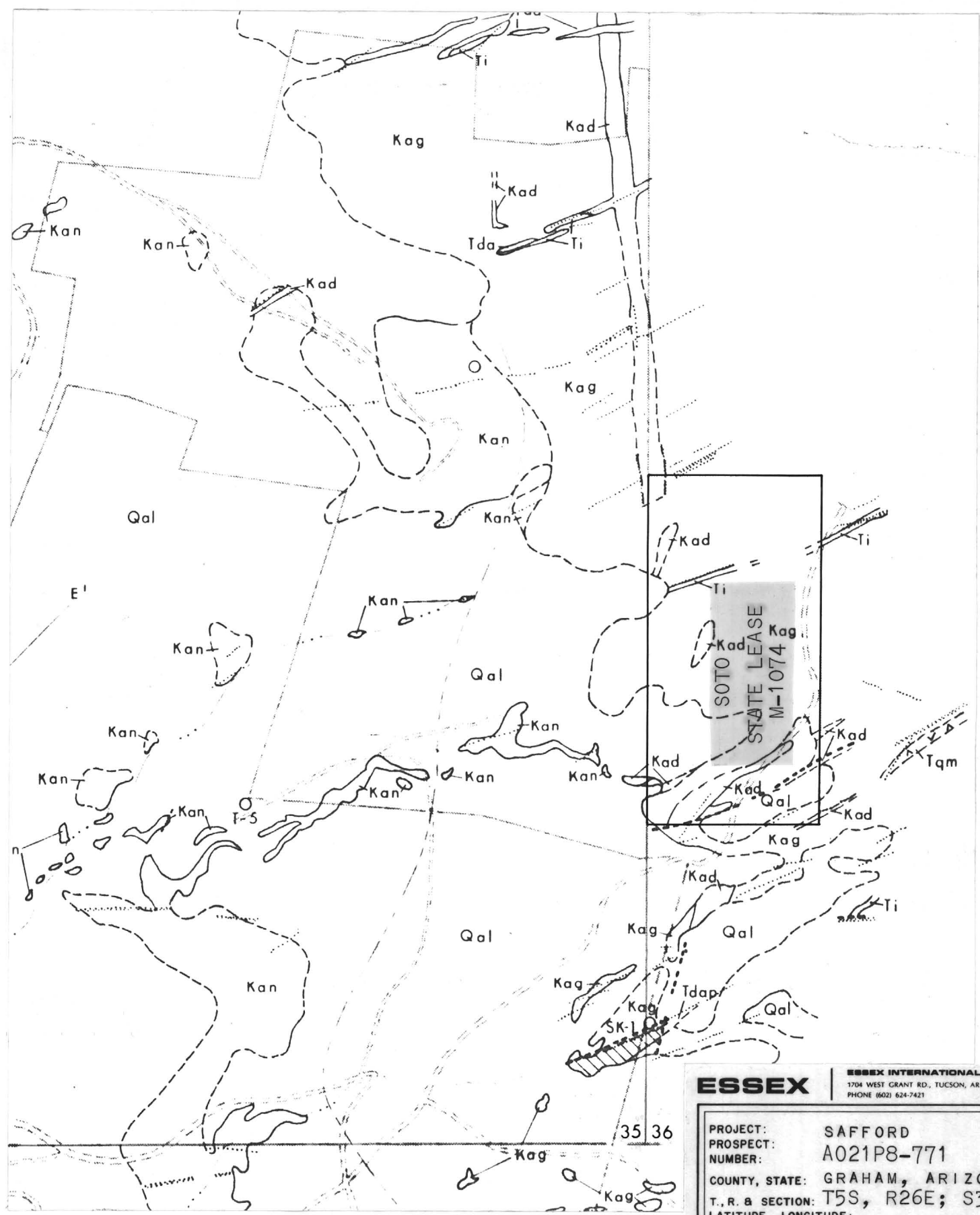




MATCH SHEET 2

LEO 2





FOR ASSESSMENT YEAR 1971/1972
SOTO STATE LEASE M-1074

ESSEX ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

PROJECT:	SAFFORD
PROSPECT:	A021P8-771
NUMBER:	
COUNTY, STATE:	GRAHAM, ARIZONA
T., R. & SECTION:	T5S, R26E; S36
LATITUDE, LONGITUDE:	

GEOLOGY MAP

SCALE:	1" = 500'
DATE:	12/12/72
DATA BY:	B. HELMING
PREPARED BY:	ATC

G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

File 103-001-011
Report No. 71-6
Contract No.
Date October 1, 1971

SOTO STATE LEASE

SUMMARY, CONCLUSIONS & RECOMMENDATIONS


The Soto State lease is occupied by a Cretaceous andesite which has been separated into an upper agglomeritic unit and a lower unit. The lower unit is the host to known copper mineralizations in this district.

The lower unit crops out only on the southwest corner of the lease and is relatively unaltered; thus, it does not indicate porphyry copper type mineralization near surface in this area.

The overlying upper agglomeritic unit varies in thickness from 0 to 250 feet within the lease boundaries and obtains a thickness of 1,000 feet some 1,200 feet east of the lease. It also is unaltered with the exception of a pervasive epidotization which is thought to be deuteric; and one zone of intrusive volcanic pipes some 1,200 feet northeast of the northeast corner that shows an intensely altered and somewhat mineralized area approximately 800 to 900 feet in diameter.

These pipe-like volcanic intrusives occur at the intersection of two different northeast trending structural zones which contain the Roper adit and Ben Hur mine mineralization. The area is considered favorable for a small porphyry copper type target to exist in depth in the lower andesite some 1,000 to 2,000 feet below outcrop.

It is recommended that detailed mapping of the area, particularly the east slope of the north-south ridge in this area--down to the Ben Hur mine be continued. If alteration and mineralization continue as far as the Ben Hur property, the prospect would be judged worthy of follow up work, resulting ultimately in drilling of 2,000 foot holes if justified by the step by step work.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

The Ben Hur claims should be optioned with free time prior to the mapping as Kennecott and others appear to be watching Essex's actions closely. However, if free time cannot be had, I would map the Ben Hur area in detail prior to putting out front money.

SCOPE

Upon verbal agreement with Mr. Paul I. Eimon, Manager of Exploration, Essex International, Inc., Tucson, Arizona, one half day was spent geologically mapping the Soto State lease on August 25, 1971. Additionally, one day was spent in office compilation and drafting of the geological map and report.

Emphasis was predominantly on detailed mapping of outcropping geology at a scale of 1" = 1,000' on air photos flown specifically for this job by Coopers Aerial Surveys of Tucson, Arizona. The geology was subsequently plotted at 1" = 500' to increase readability and presentation.

LOCATION & ACCESSIBILITY

The lease is located in the Lone Star Mining District approximately eleven miles northeast of Safford, Arizona. This is in Graham County in Township 5 south, Range 26 east, section 36. Access is via the Safford Municipal Airport road to the San Juan road to jeep trails onto the lease proper.

PROPERTY & OWNERSHIP

To allow the greatest possible distribution of the contracted time to be spent in geological mapping, no investigation of title to the lease was made. The location and configuration of the lease was supplied by Essex International,



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

Inc. and this also was not checked. Numerous claim posts were found in the field but no attempt was made to correlate these with legal description.

HISTORY

Published data on the Lone Star Mining district indicates only the San Juan mine, located one mile southwest of the Soto State lease has had production to date. This was negligible up to recent development by Producer Minerals Company, Inc. who are currently producing cement copper from oxide ore.

Since 1956, both Kennecott Copper Corporation and Phelps Dodge Corporation have reportedly drilled out and developed low grade multimillion ton orebodies. The Kennecott Deposit is two miles southeast of the lease and the Phelps Dodge orebody is two miles west of the lease.

PHYSICAL FEATURES


The lease area is on the southwest flank of the northwest trending Gila Mountains well above the pediment of this range which is deeply dissected by washes, commonly down to bed rock, creating rugged, local topography with major elevation differences in this local area.

The elevation on the lease varies from 4,550 to 4,800 feet and climate and vegetation are typical Sonoran desert for these altitudes.

GENERAL GEOLOGY

The geology of the Lone Star District is based on published information by R. F. Robinson and Annan Cook compiled from mapping and research done for Kennecott Copper Corporation.

The Lone Star District is comprised of a thick sequence of Cretaceous



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982


andesitic volcanics intruded by small irregular masses and dikes of quartz diorite, graniordiorite, quartz monzonite, dacite, andesite, quartz latite, latite and rhyolite with many variations of mineralogical content, fabric and texture.

This sequence is overlain unconformably by Tertiary volcanic flows consisting principally of basalt, dacite and andesite. A basal tuffaceous sandstone and conglomerate with distinct water worn grains and pebbles marks this unconformity throughout the district. The volcanic flows above the unconformity are all considered to be post mineral while those below are premineral.

Structurally, the northeast, Precambrian trend is predominant in the area. It controls most intrusives, both stock like and dikes along with mineralization and alteration. Strong shear zones conform to this direction as do a number of offsetting faults. Generally, the northeast trending shear zones are confined to the lower Tertiary and older rocks below the premineral unconformity. However, a number of the northeast offsetting faults also offset both younger post mineral volcanics and northwest trending block faulting which in turn has offset the post mineral volcanics.

The second major structural trend is the northwest striking block faulting related to the development of the Basin & Range province in Southern Arizona. These faults offset all rocks in the area and in some cases have probably faulted only slightly consolidated gravels against premineral andesite. Most notable of the northwest trending faults is the Butte fault which generally separates the Gila Mountain Range from its pediment in this area.

Reportedly, mineralization in all known orebodies is found in the contact zones of intrusive rocks to andesite which are in turn controlled by the stronger northeast structural trend. Both pyrite and chalcopyrite mineralization are



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

reported to decrease laterally along the shear zones from the centers of mineralization.

Halo alteration appears to also conform in intensity to the northeast trend, but varies in type with the rock type involved. Strong silicification and sericitization conform to acid and intermediary intrusive rocks in the zone of mineralization while the strong alteration of andesite is reportedly biotitization. These zones are followed along trend (northeast- southwest) by chloritized and propylized zones.


Most of the later intrusive dikes have narrow sericitized or chloritized zones accompanying them.

Epidote is the predominant mineral in the propylitic zone, so much so that the rock commonly is simple epidotized rather than propylized. This epidotization appears to predominate in the upper agglomeritic flows of the Cretaceous andesite and may in fact be principally deuteric, only being redistributed where found on fractures.

CLAIM AREA GEOLOGY

The Soto State lease is located on the contact of an upper agglomeritic andesite and a lower non-agglomeritic andesite.

The upper unit is distinguished by its agglomeritic fabric. It crops out in the main portion of the lease area. The upper unconformable contact is approximately 1,200 feet east of the lease. It is approximately 1,000 feet thick. Kennecott, however, has reported thickness of 2,700 feet for the unit. In the detailed mapping, the unit is designated as Cretaceous agglomeritic andesite (Kaa). Its only distinguishing feature megascopically from the lower unit is its agglomeritic fabric. Otherwise, they appear identical with a fine grain dense ground



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

mass varying from green to dark blackish green depending on relative distribution of mafic minerals.


Either the upper or lower unit may be porphyritic, particularly near dikes and mineralized shears, where the andesite on occasion grades from porphyritic andesite to quartz monzonite of a fairly coarse grain fabric.

Additionally, the lower unit designated as Cretaceous andesite (Ka) in the detailed mapping has a porphyritic zone near its upper boundary that appears to be an original feature of the rock. This unit is designated Cretaceous porphyritic andesite (Kpa) in the mapping. However, the validity of this as a distinct flow is open to question. The distinction between it and the porphyritic fabric developed by alteration near intrusives is strictly a question of field relationship.

An older, apparently premineral, set of andesitic dikes cut both the upper and lower andesites. They are in turn cut by the Tertiary quartz monzonite and all subsequent intrusive dikes. They are mapped as Cretaceous andesitic dikes (Kad) and are generally a denser, darker rock megascopically than the andesitic flows. They are very similar in the field to the basic Tertiary dikes (Ta), and unless field relationships indicate that the dike in question is pre-Tertiary (by being cut by Tertiary intrusives), it is mapped as a basic Tertiary intrusive (Ta) rather than the Cretaceous andesitic dike (Kad).

Quartz monzonite intrudes both andesite units as dikes and one small plug like occurrence approximately 1,000 feet east of the lease.

This quartz monzonite contains decidedly less mafic minerals and tends to be coarser grained than the Lone Star quartz diorite stock some 5,000 feet south of the lease. The mineralized quartz monzonite dike at the northwest corner of the property is even pegmatitic.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

The later Tertiary dikes have been separated into two groups, acid to intermediary and basic.

The acid to intermediate group (Ti) consists of most of the common variations in this general category with a predominance for the acid end. Thus rhyolite and white quartz latite predominate. Bull quartz dikes occur within the acid dikes and appear to be intruded rather than vein quartz although the latter also occurs.


The Tertiary acid dikes in two occasions form small pipes several hundred feet in diameter. These are both located some 1,200 feet northeast of the property and appear to be at the intersection of a N70-75°E and N45°E set of shears and subsequent dikes.

Intense alteration of these pipes and the dikes around them make megascopic identification of the rock type tenuous but they are probably white quartz latite.

The other type of Tertiary dike is basic andesite or dacite (Ta), the latter commonly with a few rounded, glassy quartz phenocrysts. No distinction has been made in age between the acid and basic varieties.

Structurally, the lease area is on the strike of the northeast trending San Juan shear zone in which the San Juan orebody is located some 5,000 feet southwest of the property.

This shear zone has two predominant trends, N70-75°E and N45°E. Dikes occupying both directions can be seen to intersect in some instances. Strong shearing in the upper agglomeritic andesite seems to favor the N70-75°E direction and is so intense that individual shears will occur within inches of each other.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

ALTERATION & MINERALIZATION

According to Kennecott, their orebody is contained in the lower Cretaceous andesite where intruded by swarms of Tertiary dikes. The lower andesite is thus a prime target in this area. It crops out only in the southwest corner of the lease but no doubt underlies the whole area below the upper andesite.

In this area the lower andesite is thoroughly altered only where intruded by quartz monzonite and volcanic dikes. A few shears within the andesite are also mineralized with limonite, hematite and gouge. Relic pyrite casts are sometimes discernible.

Away from dikes or mineralization such as at the southwest corner of the property, the andesite is only mildly altered. It contains the pervasive epidote development, although not to the degree of the upper andesite. It generally displays fine grained green to greenish black secondary chlorite. Much of this chlorite tinges on black but if any discernible green tint can be megascopically determined it is classed as chlorite rather than biotite alteration.

Some very minor fine grain distinctly black biotite is apparent in the lower andesite near mineralized dikes. However, not even these areas approach the degree of biotization described by Kennecott (10 to 50% of the rock). This leads to the inescapable conclusion that apart from the previously described dike and shear zones, the lower andesite where cropping out is relatively unaltered as compared with the reported alteration at the Kennecott and San Juan orebodies.

The quartz monzonite is only mildly altered by kaolinization, orthoclazation and chloritization. The later intrusive dikes and mineralized shears commonly display thin (sometimes only a few inches) strong zones of silicification and

2


G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

sericitization along the margin of the dikes or shears. Stronger acid volcanic dikes severely alter the country rock 20-30 feet on either side of the dike. At the previously mentioned two quartz latite pipes some 1,200 feet east of the property; sericitization and silicification of the quartz latite has all but obscured the rock. This alteration and mineralization has formed a zone some 800 to 900 feet wide of quite intense alteration and mineralized shears. However, the upper agglomeritic andesite host in this area is strongly chloritized and propylized with no evident development of secondary biotite.

With the exception of the above mentioned occurrence, the upper agglomeritic andesite is only mildly altered by chloritization and propylization. It does, however, display a pervasive content of epidote, relatively much more than any other rock type in the area, including the lower andesite. The epidote is found both on fractures and disseminated through the rock as both fine and coarse grained blebs. The preponderance of epidote in the upper agglomeritic andesite with apparently little control by later alteration or mineralization leads me to believe that it is probably deuteric. If so, it has been remobilized and redeposited on later fractures.

It is interesting to note that while the acid Tertiary dikes altered the upper andesite extensively, the quartz monzonite plug approximately 1,000 feet south of the volcanic plugs has only slightly altered the andesite within a few feet of the contact and is itself only mildly kaolinized and chloritized.

Two zones of mineralization are known east of the lease, these are the Roper adit where a tunnel has been driven on a mineralized quartz latite dike just at the east boundary line and the Ben Hur property to the northeast which was not mapped.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

EXPLORATION & DEVELOPMENT RECOMMENDED

The only serious alteration and mineralization in this area is at the two volcanic pipes some 1,200 feet east of the property.


Away from this area, alteration is so mild or non-existent in the upper agglomeritic andesite as to indicate that the favorable lower andesite horizon, from 0 to 1,000 feet below outcrop, is also likely to be only mildly altered. At the eastern lease boundary, the upper andesite is only approximately 250 feet thick--this certainly is too thin a section to hide pervasive alteration at the top of the underlying lower andesite unit.

Of course, a yet deeper alteration and mineralization could exist under the lease area but based on the known orebody geology, it would have to be 4,000 to 6,000 feet deep not to show serious alteration at the surface.

The area of the two volcanic pipes northeast of the lease is considered worthy of further detailed work. This small intensely altered area of volcanic pipes and shear type mineralization occurs at the intersection of two northeast trending structural zones which contain known copper mineralization at the Roper adit (along the eastern property line) and at the Ben Hur property some 2,000 feet northeast of the property.

The volcanic pipes are clearly the center of a small mineralized altered area, and in fact, are on strike along the northeast trending San Juan shear zone. It is possible that this mineralized zone may be more extensive in the lower andesite which would be at least 1,000 feet deep at this locality.

Negative features are restricted size of the alteration zone, and its being restricted closely to the actual volcanic pipes and dikes.



G. WARNOCK
7308 Arroyo del Oso, NE
Albuquerque, New Mexico 87109
(505) 296-7982

It is recommended that the Ben Hur group be acquired on a free time option basis to give a contiguous block of claims with the Soto State lease and the Key and Keystone claims. This should be followed by additional detailed mapping, particularly on the east slope of the ridge held up by the pipes toward the Ben Hur property, an area which was not covered in this project. If the mineralization and alteration can be shown to extend as far as the Ben Hur property, the area would be a serious target for a small porphyry type deposit at a depth of 1,000 to 2,000 feet, perhaps similar to the San Juan.

If the Ben Hur group cannot be obtained with free time, I would recommend the detailed mapping in any case--this to form a base for the decision to lay out front money for the Ben Hur group.



EXPLANATION

Qal, alluvium

(Tqd. fl.) predominantly Tertiary quartz diorite float.

(Ka. fl.) predominantly lower Cretaceous andesite float.

(Kaa. fl.) predominantly upper Cretaceous andesite float.

Tbb

Tbb, basal tuffaceous sandstone and conglomerate. Forms marker bed at unconformity on older Cretaceous volcanics.

Ti Td

Ti, rhyolite, latite and quartz latite dikes. Td, basalt flow with some andesite, dacite and tuff.

Tb

Tqm Tqd

Tqm, quartz monzonite.
Tqd, quartz diorite.

Kad

Kad, andesite dikes intruding the Cretaceous section but intruded by Tertiary.

Kaa

Kaa, upper andesite predominantly agglomerate.

Ka Kpa

Ka, lower andesite.
Kpa, lower porphyritic.

Contact, dashed where indefinite or inferred

Tlo
Strike & dip of beds

Strike & dip of joint & shear zones

Outcrop boundary

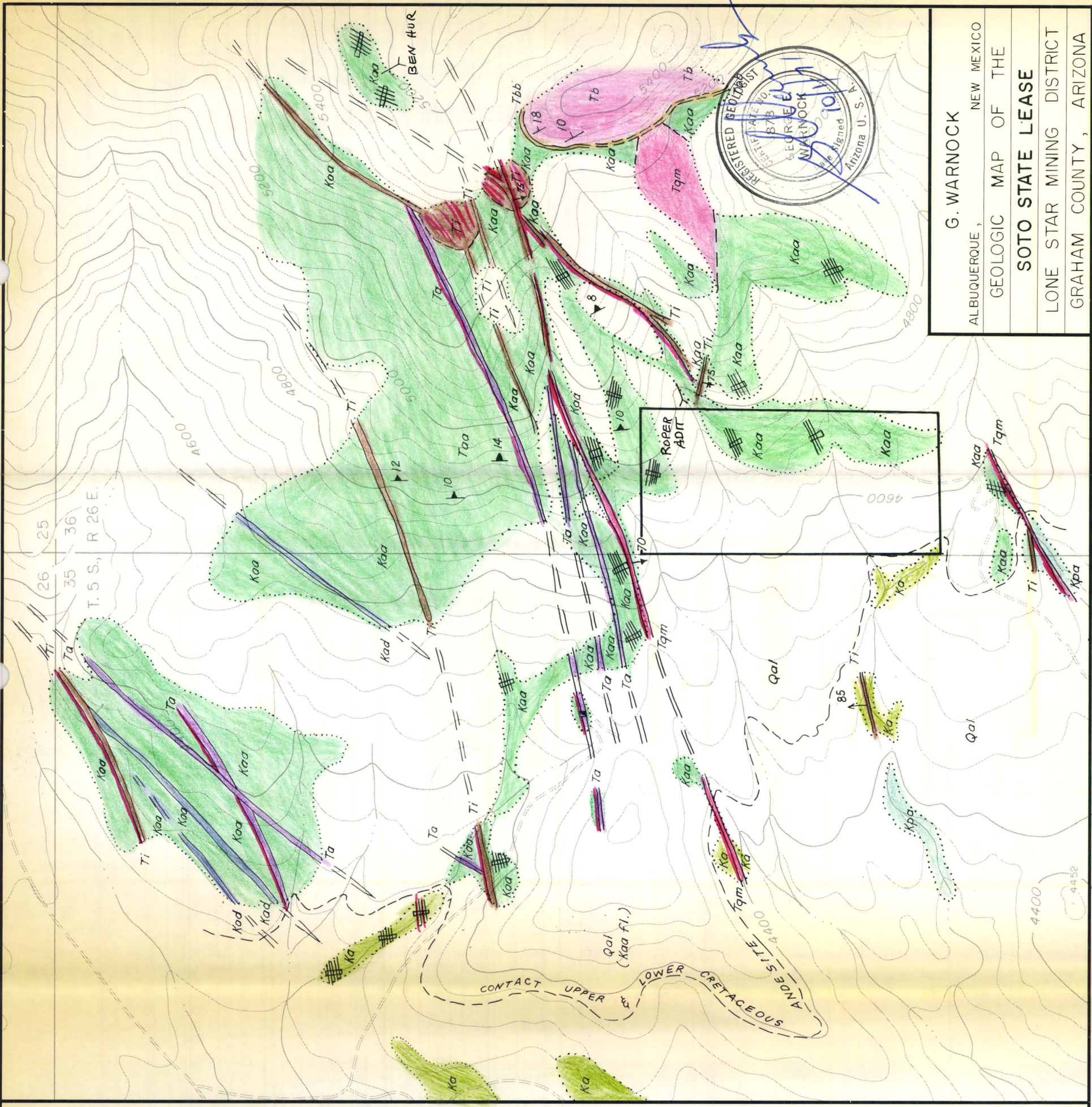
Topographical base, USGS advance sheet,
Safford NW, Graham County,
Arizona, 1:24,000

Fault, dashed where indefinite or inferred

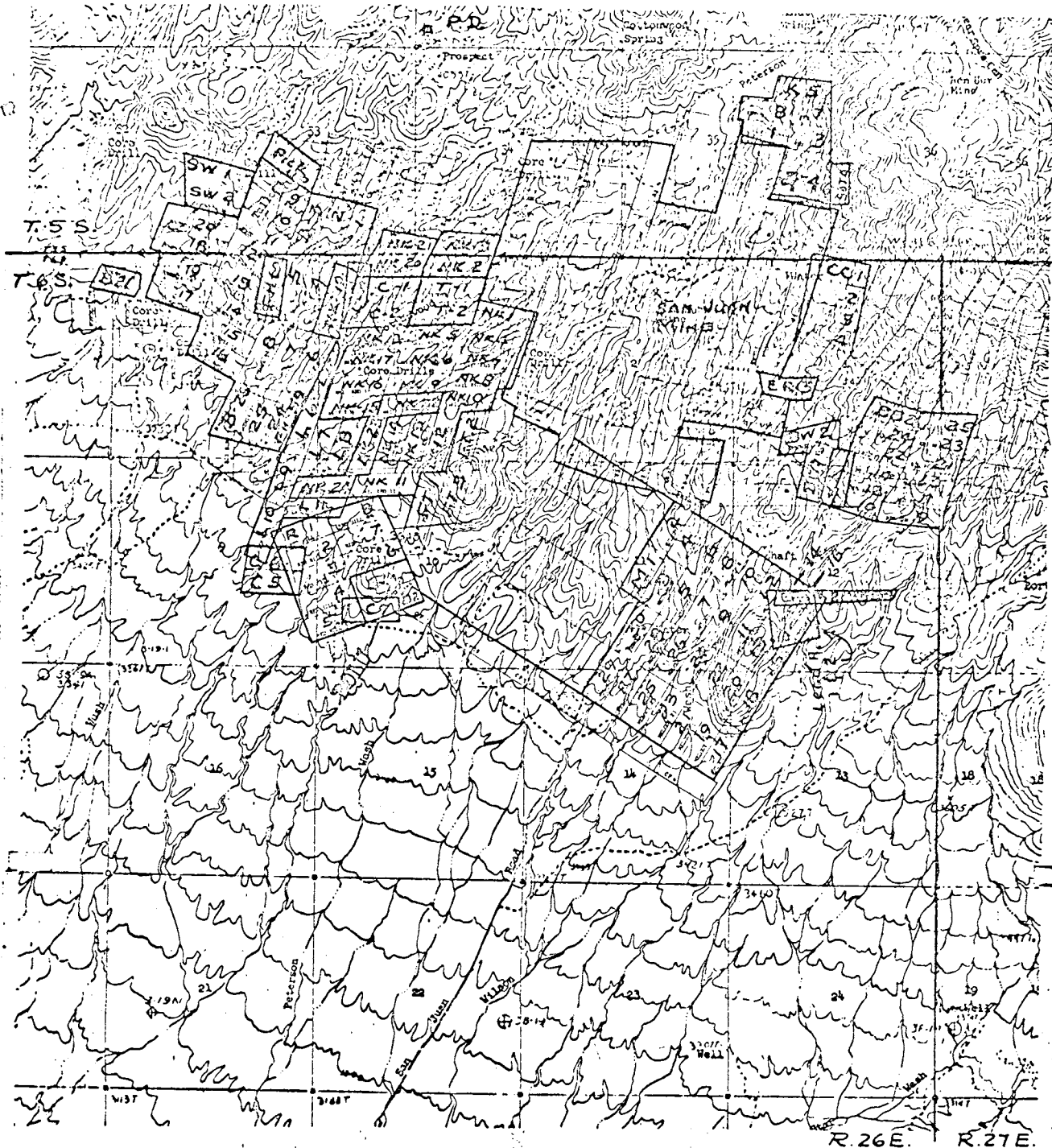
Strike & dip of flow layers

Cu
Veins mineralized with limonite after sulfides (predominantly pyrite) and hematite. Cu denotes some minor chrysocolla

Claim group boundary



G. WARNOCK
ALBUQUERQUE, NEW MEXICO
GEOLOGIC MAP OF THE
SOTO STATE LEASE
LONE STAR MINING DISTRICT
GRAHAM COUNTY, ARIZONA



CLAIM GROUPS					
Parcel No.	Group	Parcel No.	Group	Parcel No.	Group
1	Nail Keg 1-10	6	Flat Top 1-36	11	Lead Hill 1 & 2
2	Nail Keg 20-24	7	Melody 1-30	12	Key 1-8
3	Red Hill 1-8	8	Lager 4-11	13	Mesquite
* 4	Bohemia 1-21, 24-26	9	Big Ben	14	Copper Chief
5	Cochino & Coffee	10	Bardwell 1 & 2	15	Sandweah 1 & 2
				16	Pickup

*4 Includes FOOTHILL 59&60
And TECOTE 1&2

17 SOTO
STATE LEASE

18 BOLD

ESSEX


ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD. TUCSON, ARIZONA 85705
PHONE (602) 624-7471

PROJECT: NAIL KEG (SAFFORD)
PROSPECT: A021
NUMBER: A021
COUNTY, STATE: GRAHAM, ARIZ.
T, R & SECTION: T5&6S R26E
LATITUDE, LONGITUDE:

PROPERTY MAP

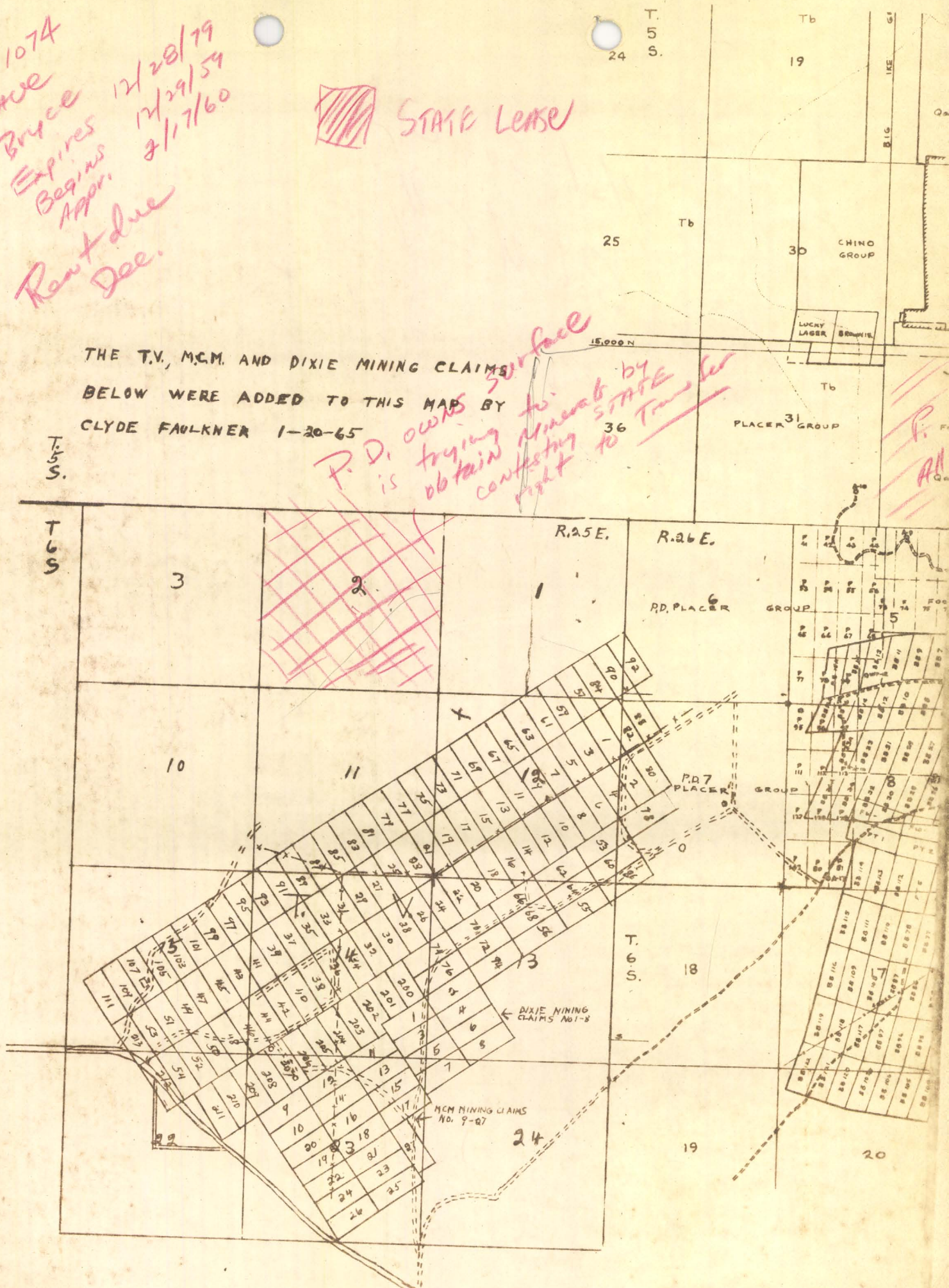
SCALE: none
DATE: 7/21/71
DATA BY: GH
PREPARED BY: blr

M-1074
 Dave
 Bryce 12/28/79
 Expires 12/29/59
 Begins 2/17/60
 Appr.
 Rent due
 Dec.

 STATE LEASE

THE T.V., M.C.M. AND DIXIE MINING CLAIMS
 BELOW WERE ADDED TO THIS MAP BY
 CLYDE FAULKNER 1-20-65

surface
 P.D. owns to
 trying minerals by
 obtaining STATE
 contesting to TIME
 right



Parcel 17



CLAIM GROUPS					
Parcel No.	Group	Parcel No.	Group	Parcel No.	Group
1	Nail Keg 1-19	6	Flat Top 1-36	11	Lead Hill 1 & 2
2	Nail Keg 20-24	7	Melody 1-30	12	Key 1-8
3	Red Hill 1-8	8	Lager 4-11	13	Mesquite
* 4	Bohemia 1-21, 24-28	9	Big Ben	14	Copper Chief
5	Cochino & Coffee	10	Bardwell 1 & 2	15	Sandwash 1 & 2
				16	Pickup

*4 Includes FOOTHILL 59&60
And TECOTE 1&2

ESSEX

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

PROJECT: NAIL KEG (SAFFORD)
PROSPECT: A021 *Graham*
NUMBER: *17*
COUNTY, STATE: GREENLEE, ARIZ.
T.R. & SECTION: T5&6S R26E
LATITUDE, LONGITUDE:

PROPERTY MAP

SCALE: none
DATE: 7/21/71
DATA BY: GH
PREPARED BY: blr

Glover *Parcel 17*
Bert *Soto*
STATE LEASE
M-01074

EXPLANATION

Quaternary

Tertiary

Cretaceous

Qal (Tqd. fl.) (Ka. fl.) (Kaa. fl.)

Qal, alluvium

(Tqd. fl.) predominantly Tertiary quartz diorite float.

(Ka. fl.) predominantly lower Cretaceous andesite float.

(Kaa. fl.) predominantly upper Cretaceous andesite float.

Tbb

Tbb, basal tuffaceous sandstone and conglomerate. Forms marker bed at unconformity on older Cretaceous volcanics.

Ti Td

Ti, rhyolite, latite and quartz latite dikes. Td, basalt flow with some andesite, dacite and tuff.

Tb

Td, andesite and dacite.

Tqm Tqd

Tqm, quartz monzonite

Tqd, quartz diorite.

Kad

Kad, andesite dikes intruding the Cretaceous section but intruded by Tertiary.

Kaa

Kaa, upper andesite predominantly agglomerate.

Ka Kpa

Ka, lower andesite

Kpa, lower porphyritic.

Contact, dashed where indefinite or inferred

Fault, dashed where indefinite or inferred

Tfo

Strike & dip of beds

Tfd

Strike & dip of flow layers

Tfs

Strike & dip of joint & shear zones

Cu

Veins mineralized with limonite after sulfides (predominantly pyrite) and hematite. Cu denotes some minor chrysocolla

Ka

Outcrop boundary

Topographical base, USGS advance sheet,

Safford NW, Graham County,

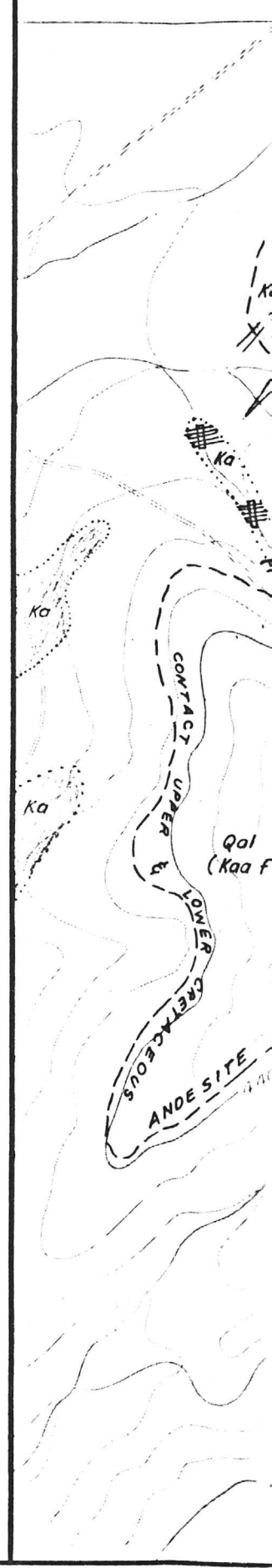
Arizona, 1:24,000

Claim group boundary

Scale 1" = 500'

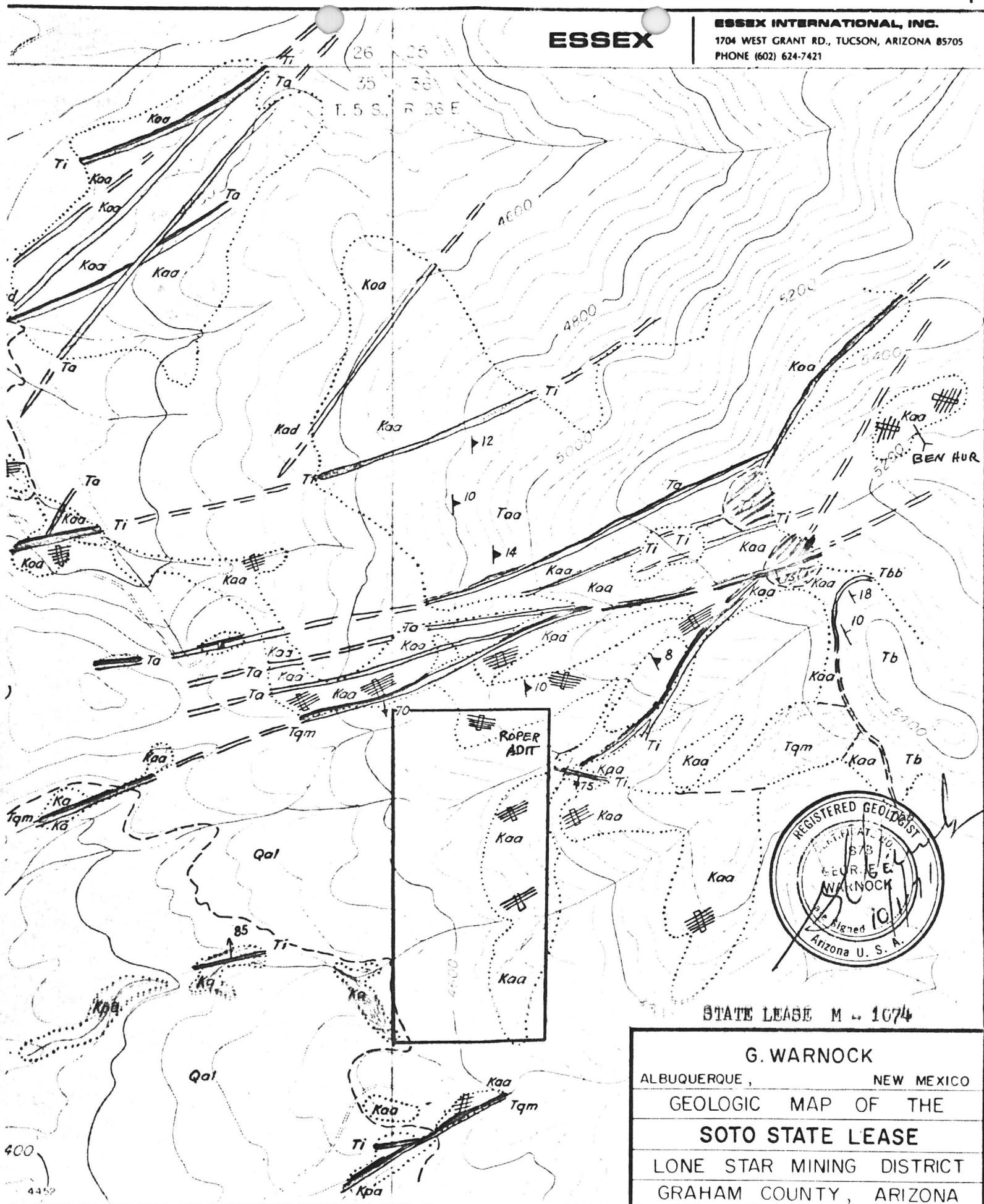


Contour Interval 40'



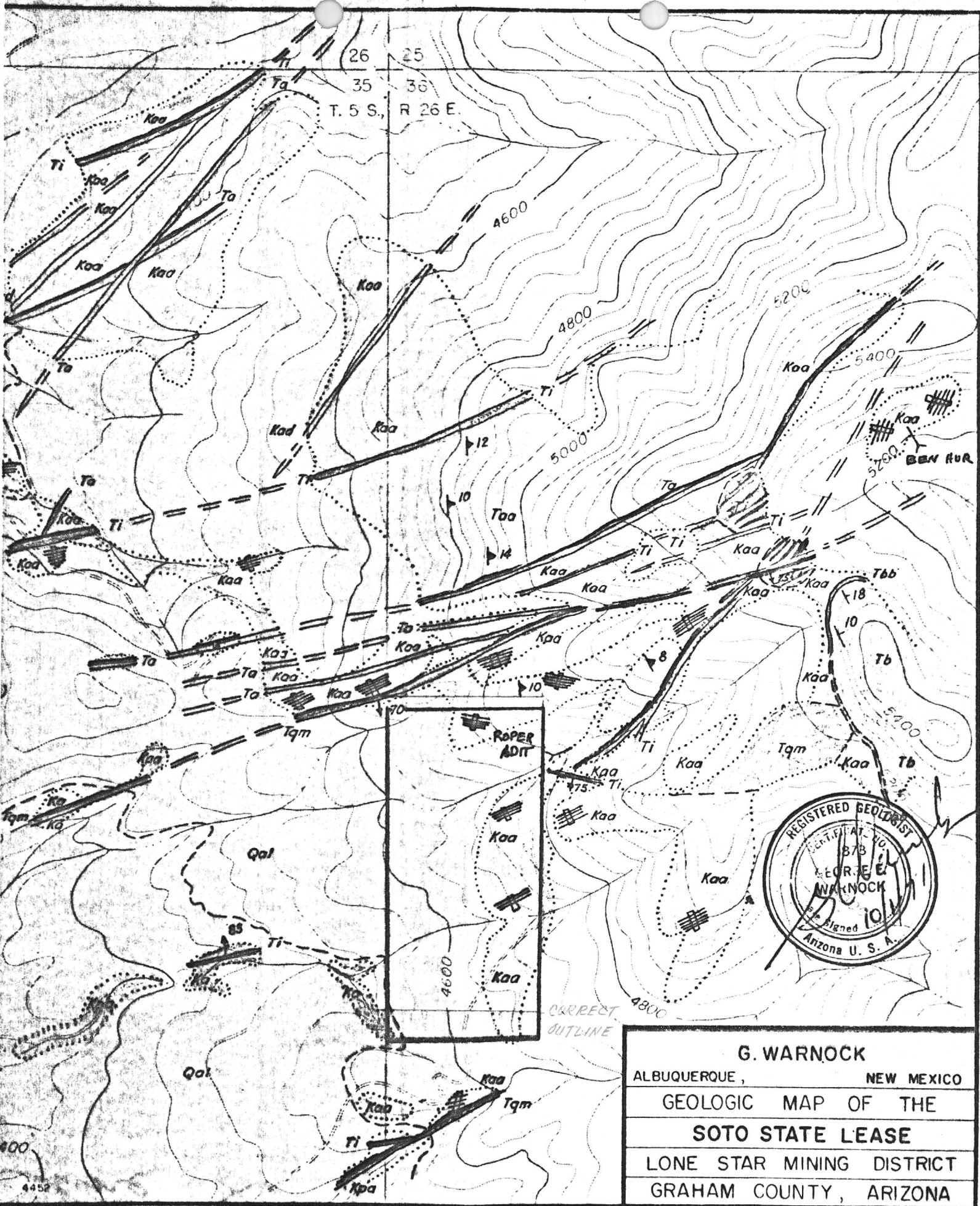
ESSEX

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

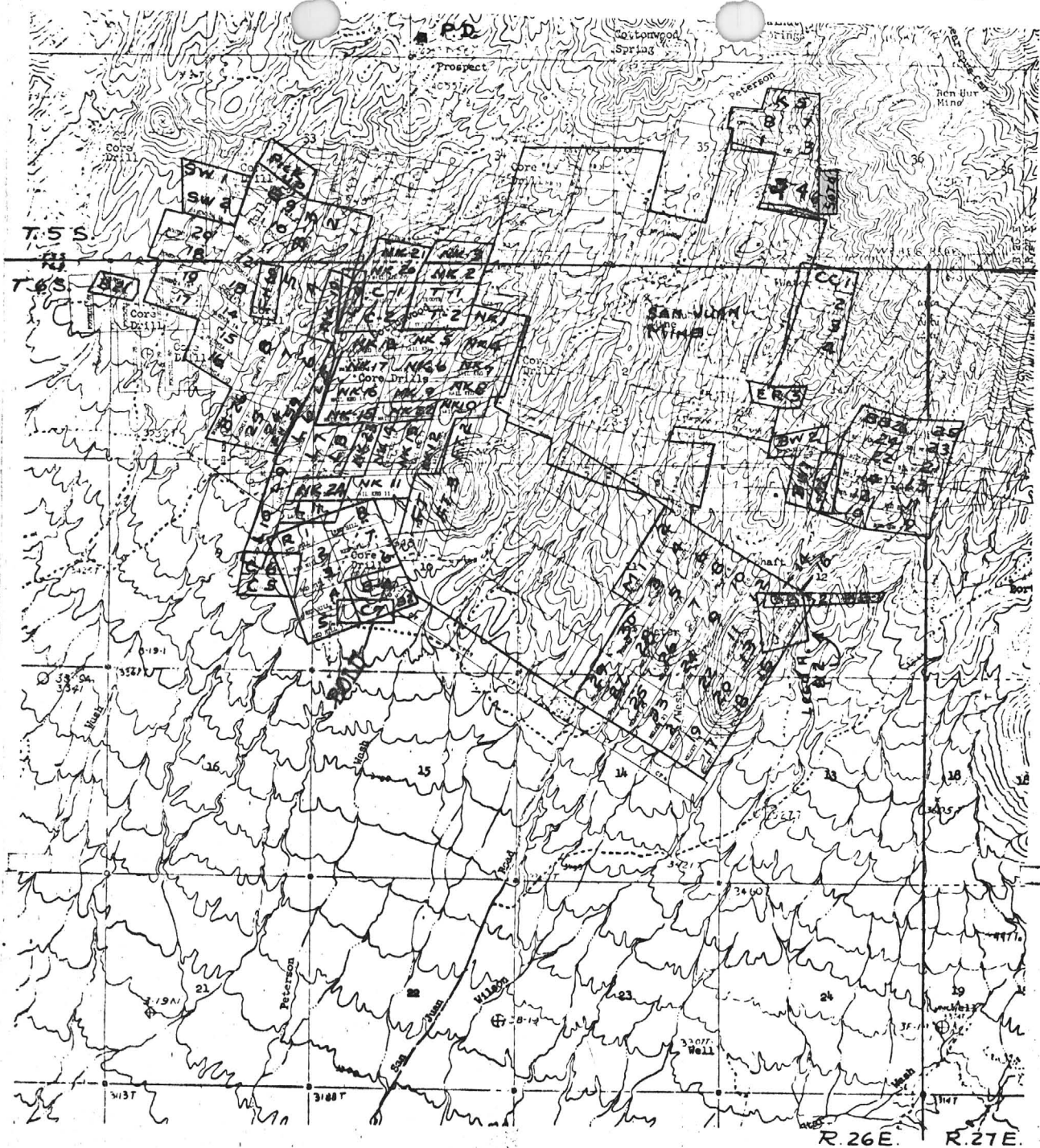


STATE LEASE M. 1674

G. WARNOCK	
ALBUQUERQUE,	NEW MEXICO
GEOLOGIC MAP OF THE	
SOTO STATE LEASE	
LONE STAR MINING DISTRICT	
GRAHAM COUNTY, ARIZONA	



G. WARNOCK	
ALBUQUERQUE,	NEW MEXICO
GEOLOGIC MAP OF THE	
SOTO STATE LEASE	
LONE STAR MINING DISTRICT	
GRAHAM COUNTY, ARIZONA	



CLAIM GROUPS					
Parcel No.	Group	Parcel No.	Group	Parcel No.	Group
1	Nail Keg 1-19	6	Flat Top 1-36	11	Lead Hill 1 & 2
2	Nail Keg 20-24	7	Melody 1-30	12	Key 1-8
3	Red Hill 1-8	8	Lager 4-11	13	Mesquite
* 4	Bohemia 1-21, 24-26	9	Big Ben	14	Copper Chief
5	Cochino & Coffee	10	Bardwell 1 & 2	15	Sandwash 1 & 2
				16	Pickup

*4 Includes FOOTHILL 59&60
And TECOTE 1&2

17 SOTO
STATE LEASE

18 BOLD

ESSEX

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

PROJECT: NAIL KEG (SAFFORD)
PROSPECT: A021
NUMBER: A021
COUNTY, STATE: GRAHAM, ARIZ.
T, R & SECTION: T5&6S R26E
LATITUDE, LONGITUDE:

PROPERTY MAP

SCALE: none
DATE: 7/21/71
DATA BY: GH
PREPARED BY: blr

EXPLANATION

Qal	(Tqd. fl.)	(Ka. fl.)	(Kaa. fl.)
-----	------------	-----------	------------

Qal, alluvium

(Tqd. fl.) predominantly Tertiary quartz diorite float.

(Ka. fl.) predominantly lower Cretaceous andesite float.

(Kaa. fl.) predominantly upper Cretaceous andesite float.

Tbb

Tbb, basal tuffaceous sandstone and conglomerate. Forms marker bed at unconformity on older Cretaceous volcanics.

Ti Td

Ti, rhyolite, latite and quartz latite dikes. Tb, basalt flow with some andesite, dacite and tuff.

Tb

Td, andesite and dacite.

Tqm Tqd

Tqm, quartz monzonite.

Tqd, quartz diorite.

Kad

Kad, andesite dikes intruding the Cretaceous section but intruded by Tertiary.

Kaa

Kaa, upper andesite predominantly agglomerate.

Ka Kpa

Ka, lower andesite.

Kpa, lower porphyritic.

Contact, dashed where indefinite or inferred

Fault, dashed where indefinite or inferred

Tlo

Strike & dip of beds

Tlo

Strike & dip of flow layers

Tlo

Strike & dip of joint & shear zones

Cu

Veins mineralized with limonite after sulfides (predominantly pyrite) and hematite. Cu denotes some minor chrysocolla

Ka

Outcrop boundary

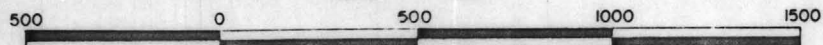
Topographical base, USGS advance sheet,

Safford NW, Graham County,

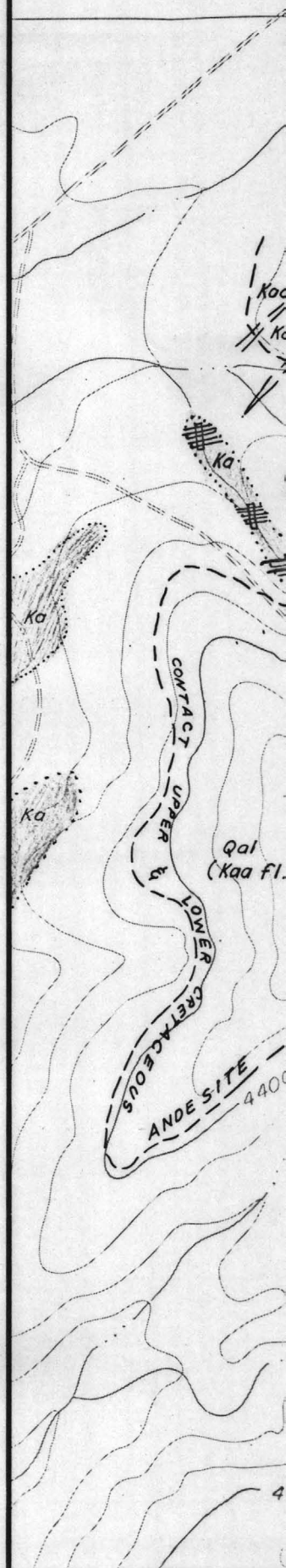
Arizona, 1:24,000

Claim group boundary

Scale 1" = 500'



Contour Interval 40'



ESSEX

ESSEX INTERNATIONAL, INC.

1704 WEST GRANT RD., TUCSON, ARIZONA 85705

PHONE (602) 624-7421

T. 5 S., R. 26 E.



STATE LEASE M - 1074

G. WARNOCK

ALBUQUERQUE, NEW MEXICO

GEOLOGIC MAP OF THE

SOTO STATE LEASE

LONE STAR MINING DISTRICT

GRAHAM COUNTY, ARIZONA