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GEOLOGIC REPORT

on the

SAFFORD PROJECT

Graham County, Arizona

June 1973

by

Bob H. Helming

ESSEX INTERNATIONAL, INC.

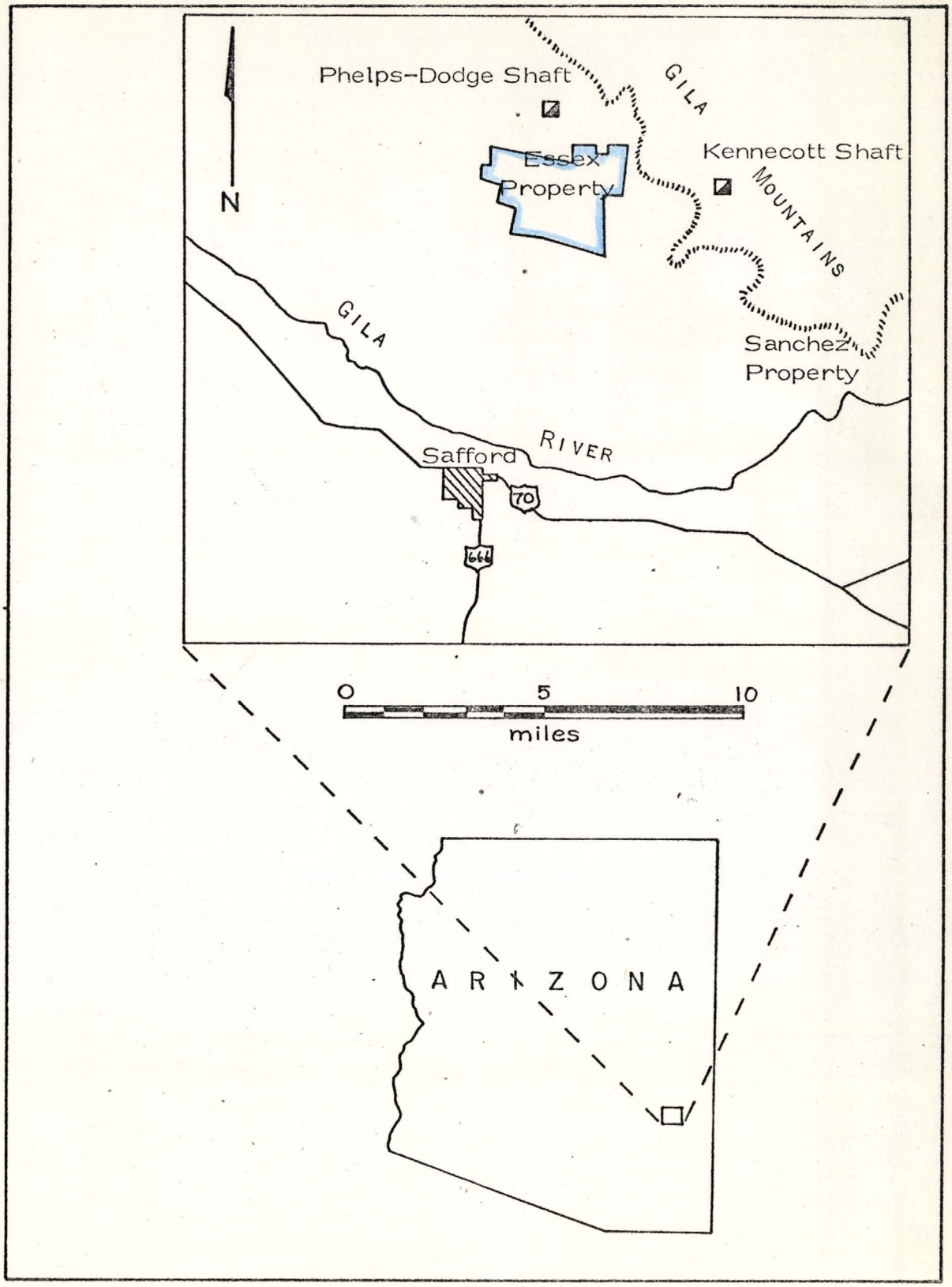
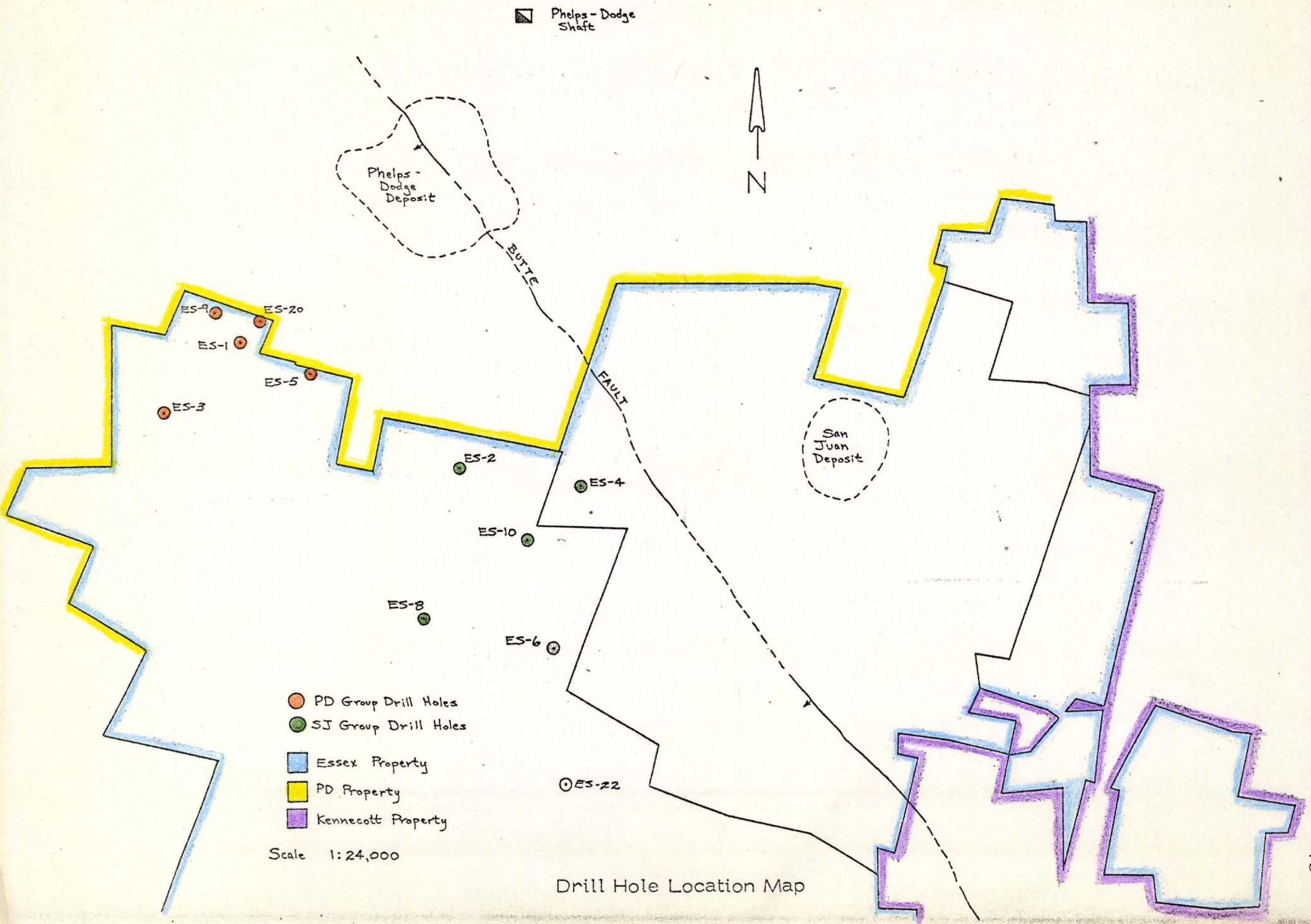


Figure 1. Location map, Essex property, Graham County, Arizona



Drill Hole Location Map

EXPLANATION

QUATERNARY	Qal	alluvium and gravels
TERTIARY	Tb	basalt
	Ts	sedimentary and tuffaceous beds
	Tri	rhyolite plugs
	Trf	fragmental rhyolite
	Tvt	vitrophyre
	Ta	andesite
	Ti	rhyolite, quartz latite, etc., dikes
	Tvl	undifferentiated volcanics
LARAMIDE		breccia pipes
	qmp	quartz monzonite porphyry
	qm	quartz monzonite
	gd	granodiorite
	qd	quartz diorite
MESOZOIC	Kad	andesite porphyry intrusives
	Kag	andesite agglomerate
	Kan	andesite porphyry
	Kvu	undifferentiated volcanics

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MAP SET

Property Map	1 inch = 2000 feet
Geologic Map	1 inch = 500 feet
District Geologic Map	1 inch = 2000 feet
Alteration and Mineralization Map	1 inch = 500 feet
Geologic Cross Sections	1 inch = 500 feet
Section A-A^1	
" B-B^1	
" C-C^1	
" D-D^1	
" E-E^1	
" J-J^1	
IP Interpretation Map	1 inch = 500 feet
Ground Magnetic Map	1 inch = 500 feet

LOCATION

The Lone Star Mining District is located nine miles north-northeast of Safford, Graham County, in southeast Arizona. The geographical coordinates are latitude 32° 57' N., longitude 109° 39' W. Most of the district is covered by the USGS Safford 15 minute quadrangle map (Figure 1).

PROPERTY

Essex has established an important property position in the Safford area by virtue of option agreements or part ownership in a total of 295 lode mining claims. One of the maps accompanying this report shows the distribution of Essex property relative to Phelps-Dodge Corporation, Kennecott Copper Corporation and district copper deposits.

DISTRICT GEOLOGY[1]

General

The Gila Mountains are a northwest trending range composed of volcanic rocks of Cretaceous (?) and Tertiary age and Laramide and Tertiary age intrusives. Basin and range faulting combined with subsequent erosion to form the present rugged topography along the crest of the range.

The southwest flank of the range is composed of Cretaceous andesite volcanic rocks and various intrusive plutonic and volcanic rocks closely related to copper mineralization. The crest and northeast flank of the range consist of post-mineral Tertiary volcanic rocks dipping slightly to the north and northeast from 10 to 12 degrees. Tertiary volcanics crop out on Essex property only as erosional remnants capping small hills on the downfaulted side of the Butte Fault, the principal northwest trending basin and range structure in the district.

Sedimentary Rocks

The oldest and youngest rocks in the area are sedimentary. Recent gravels which cover most of Essex' property southwest of the Butte Fault are the youngest rocks. Xenoliths of quartzite up to 150 feet in diameter occurring in the Lone Star stock may be of Cambrian age.

Igneous Rocks

Extrusive Rocks. The Cretaceous older volcanic series is host rock for most of the economically important copper mineralization in the district. This series is divided by most observers into an upper and lower unit. The lower unit is predominantly dark gray andesite porphyry with tuffaceous and fragmental sections. The upper unit is green to gray andesite, similar in composition to the lower unit but distinctly fragmental in nature. The term agglomerate is used by Essex personnel, but on other maps the terms fragmental volcanic and flow breccia are seen. Generally these units are readily mappable but near the contact where intercalation occurs and fragmental character is weakly defined the rock types may be difficult to differentiate.

The older volcanic series is overlain by younger post-mineral volcanic rocks which Kennecott geologists have divided into intermediate and younger volcanic series. These younger rocks consist principally of

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[1] Robinson and Cook, 1966

andesites, dacites, and basalts and have a combined thickness exceeding 1500 feet. On Essex property these post mineral volcanics consist almost entirely of basalt with only very thin sections of dacite. At the base of this younger volcanic series a few feet of grit, sandstone, and conglomerate frequently occurs.

Intrusive Rocks. Intrusive rocks of Eocene age cut the older volcanic series and other intrusive rocks. The Lone Star pluton is the largest known intrusive mass and is principally quartz diorite porphyry with minor granodiorite and quartz monzonite. It crops out in the eastern portion of Essex' property as an elongate mass trending northeast with dimensions approximately 8000 feet by 4000 feet. Its extension to the northeast is buried by younger volcanics near the Kennecott deposit. The southwest extension is buried by recent gravel but geophysical and drilling evidence strongly suggest that it continues southwesterly toward the valley at least two miles beyond the last outcrops.

The San Juan stock, composed of quartz monzonite porphyry, granodiorite porphyry, and granodiorite, is a northeasterly elongated oval having dimensions approximately 1500 feet by 1000 feet. Numerous other very small plug like bodies intrude the older volcanic series and the quartz diorite porphyry.

Dikes are abundant and vary widely in composition from latite, andesite through dacite, quartz latite and rhyolite. They range in width from a few inches to several tens of feet and may be traced up to 2000 feet or more. Some of the acid dikes undoubtedly represent the latest intrusive event in the district for they cut all other intrusive rocks and in some places cut mineralized veins.

Structure

A pronounced northeast structural trend is evident in drainage patterns and lineations as observed on air photos and in alignment of veins, faults, and volcanic-intrusive contacts as portrayed on the geologic map. Most airphoto linears represent some geologic feature that can be mapped on the ground. A subdued east-west structural grain around the Kennecott and San Juan deposits is more pronounced around the Phelps-Dodge deposit where at least two strong east-west structures are marked by andesite dikes.

The most obvious structure is the Butte Fault, known to Phelps-Dodge as the Foothill Fault, a basin and range type fault which can be traced on air photos and on the ground for a distance of at least six miles. The surface trace of the southeast end is lost beneath alluvium one and

one-half miles southeast of the San Juan mine. Its extension beyond this point has not been verified by Essex personnel. The fault is a normal fault striking N40W and dipping 60-65 degrees southwest. The apparent continuity of the Lone Star quartz diorite porphyry across the projected fault southeast of the San Juan mine seems to indicate no large horizontal displacement. There is no evidence yet to indicate the Butte Fault marks an old fracture that was directly or indirectly responsible for positioning the orebodies.

The Butte Fault is important to Essex' exploration program for two reasons: (1) a portion of the lower grade mineralization peripheral to the Phelps-Dodge orebody has been downfaulted to a position within Essex' property; (2) approximately two-thirds of all Essex' property is covered by alluvium on the downfaulted block thus necessitating "blind" exploration.

Robinson and Cook state that the Kennecott deposit and the San Juan mine are located in separate but parallel shear zones that are essentially vertical and strike N50-65E. It is not implied, nor has it been shown that these shear zones controlled emplacement of the deposits. The structural control for the Phelps-Dodge and Sanchez deposits is unknown to Essex. However, a glance at a map of the district and the alignment of all four deposits is apparent. The N55W line thus formed does not coincide with the Butte Fault and in fact intersects the fault at the Phelps-Dodge deposit. Apparently Phelps-Dodge and AMAX adhere to Lowell's theories of linear emplacement of porphyry copper deposits for they are actively exploring on both ends of an extended line drawn through the four deposits in the area.

An interesting photogeologic feature is the circular anomaly that clearly marks the Phelps-Dodge deposit. This anomaly transgresses the Butte Fault even though the younger volcanics and the fault are post-ore features. A similar circular anomaly northeast of the San Juan mine is a rhyolitic volcanic vent.

Alteration

Essex' staff has adapted the four distinct alteration types described by Kennecott and Phelps-Dodge geologists. These types are as follows from the periphery toward the center: propylitic, chlorite, biotite, quartz-sericite.

The propylitic zone is characterized by the alteration of plagioclase to epidote and mafic minerals to chlorite and epidote. Epidote tends to predominate. Robinson and Cook thought it difficult to relate this type

of alteration to mineralization and other alteration. Probably all rocks of the older volcanic series in the district are propylitized, thus suggesting this may be deuteric alteration. Calcite and sericite are minor alteration minerals in this zone.

Chlorite is an ubiquitous alteration mineral found in all stages as a replacement of mafics, in the groundmass, and commonly in veins. Kennecott's chlorite zone is by definition that zone in which chlorite predominates over epidote and/or secondary biotite. Such a zone exists around the San Juan and Kennecott deposits. Chlorite continues to be found throughout the biotite zone both disseminated and in veinlets but is much weaker than biotite.

Biotite alteration is characterized by flakes and clumps of brown biotite replacing mafic minerals and the development of finely disseminated biotite in the groundmass. Biotite occurs less frequently in veinlets with sulfides. The geologic map shows the approximate outline of the biotite alteration zone around the San Juan and Phelps-Dodge deposits.

Quartz-sericite is considered to be the last alteration event and is closely related to acid or intermediate intrusives, veins, and faults. Several small areas of massive quartz-sericite-limonite have been mapped east and northeast of the San Juan mine. This alteration is most common to veins or vein systems a few inches to several tens of feet wide. Hematite, quartz, and copper oxides may be present. Quartz-sericite alteration appears to be quite restricted but has been observed to some extent in all Essex drill holes.

Mineralization

Primary sulfide mineralization is similar in all deposits in the district and consists of pyrite, chalcopyrite and bornite principally in veins but also as disseminations. Pyrite is the most abundant and widespread sulfide mineral. Chalcopyrite is the most important ore mineral in the Kennecott deposit, but in the Phelps-Dodge deposit bornite is the most abundant copper-bearing mineral in the ore zone. Molybdenite may be significant in parts of the Kennecott and Phelps-Dodge deposits.

Chalcocite and lesser covellite probably occur to some extent in all the areas but are known to be important at the Kennecott deposit.

Chrysocolla is easily the most abundant oxide mineral in all the deposits. Oxide minerals present in minor amounts are malachite, brochantite, cuprite, tenorite, and several others.

DISTRICT COPPER DEPOSITS

Phelps-Dodge Deposit

Published information by Phelps-Dodge indicates a primary sulfide orebody containing 250 million tons of 0.92 percent copper with significant molybdenum reported in a few drill holes. The predominant ore mineral is bornite with lesser chalcopyrite. Actual tonnage of this grade rock or slightly lower grade may be considerably higher. Some oxide ore is known but no supergene enrichment is reported. Mineralization occurs in andesite porphyry, the lower unit of the older volcanic series. Considerable intrusive rock was encountered at depth but information available does not specify the type of occurrence or relationship to mineralization.

The surmised outline of the orebody is shown on the geologic map projected to the surface. The top of the orebody is approximately 1200 feet below surface at elevation 2800 feet. Most of the drill holes in ore were stopped at approximately 2600 feet. However, this data is nearly ten years old and other information indicates that more recent drill holes exceeding 3000 feet in depth have remained in ore.

Kennecott Deposit

The Safford deposit of Kennecott Copper Corporation has been described in detail by Robinson and Cook. It contains approximately 400 million tons of oxide, oxide-sulfide, and sulfide ore in the older volcanic series associated with acid-intermediate dikes and plugs. The grade of +0.4 percent copper is presently considered sub-economic. Recently four deep holes have been drilled to depths of about 5000 feet southwest of the previously described deposit. At least one hole is reported to have encountered primary sulfide mineralization containing approximately 0.6 percent copper from 3000 to 5000 feet. The host rock is apparently intrusive of quartz monzonite-granodiorite composition in contrast to other deposits in the district where the principal ore-bearing rocks are volcanic.

The relationship of the new deep mineralization to the original deposit 2000 feet higher and 4000 feet to the northeast is not known. Kennecott, through its Ledgemont Research Lab, is actively testing the possibility of in situ leaching.

San Juan Mine

The San Juan mine is presently being operated by Producer Minerals Corp. of El Paso, Texas. Geology of the deposit has been described in a 1971 masters thesis by Blake. Chalcopyrite mineralization

was deposited in the volcanic and intrusive rocks along the contact of the quartz monzonite porphyry plug. Subsequent leaching appears to have created a chalcocite blanket which was then oxidized to form the mixed oxide sulfide mineralization recently mined. Current production is by leaching the oxide ore. Accurate ore reserves are not available but are reported to be 15 million tons at 0.52 percent copper.

Sanchez Deposit

Inspiration Consolidated Copper Company has recently completed evaluation of an oxide-sulfide copper deposit near the community of Sanchez, nine miles east-northeast of Safford on the north side of the Gila River. The deposit is believed to contain at least 200 million tons of unknown grade but probably +0.4 percent copper. Geologically it appears similar to the San Juan mine with the best mineralization occurring in the contact zone between Cretaceous volcanics and quartz monzonite porphyry. Inspiration has recently announced this property will be brought into production in the near future.

GEOLOGY OF ESSEX PROPERTY

Geology of the Essex property and adjoining land has been mapped on a scale of 1 inch equals 500 feet. The Butte Fault is a convenient line for dividing the property into two areas of discussion: the northeast or footwall block and the southwest or hanging wall block.

Footwall Block

All the elements of lithology, structure, alteration, and mineralization previously mentioned under district geology are found on the east side of Essex' property northeast of the Butte Fault. Essex has conducted no exploration in the area other than geologic mapping, review of literature, and compilation of available data on the San Juan and Phelps-Dodge deposits.

The contact between upper and lower units of the older volcanic series is frequently difficult to identify due to intercalating of beds, alteration, and large amounts of fragmental material in both units. Therefore distinction of this contact in some areas of the map depends upon the amount of outcrop available and individual interpretation. The biotite alteration line around the San Juan deposit is drawn where megascopic secondary biotite is first seen in outcrop, therefore this line may include a peripheral zone in which chlorite is equivalent to or stronger than biotite. The biotite line on Phelps-Dodge property was derived primarily from patent information but confirmed in several areas by field observation. The difference in size of the biotite zones related to the two deposits may reflect different levels of exposure with the hydrothermal system.

The surmised outline of the Phelps-Dodge orebody is based on assays from brief drill hole descriptions contained in the patent application. Contours are drawn on the highest ten foot assay from each hole. Obviously this approach would give exaggerated dimensions. The assay contours cross the Butte Fault only because they are projected to the surface. No ore grade assays were reported from drill holes which were stopped in the hanging wall block before penetrating the Butte Fault. This is misleading because all the deeper holes which bottomed in the hanging wall were stopped at approximately 2500 feet which is inadequate to test the ground.

Essex has acquired more than 40,000 feet of core from drill holes on the San Juan mine previously described. The entire series of 53 "P" holes has been logged. These were mostly shallow holes drilled in the vicinity of the open pit to test oxide ore reserves. Assays are available from only a few of the holes at this time, and these tend to support the reported ore reserve. Three of these holes were stopped in good sulfide mineralization and should be continued to test the possibility of significant sulfide mineralization at depth.

Hanging Wall Block

The hanging wall block southwest of the Butte Fault is more than ninety percent covered by recent gravel and approximately two-thirds of the outcrops are post-mineral volcanics. The exposed pre-mineral rocks show only propylitic alteration except for quartz-sericite-limonite in a few scattered fissure-veins. The veins are anomalous in copper and are the only surfical expression of mineralization. The only structures outcropping are a few small faults.

Drilling has provided the information necessary for interpretation of geology in the hanging wall block. Essex drilled twenty three holes for a total of 43,541 feet from August 1971 through April 1973.

The holes have been divided into two groups depending on whether the alteration-mineralization reflects the Phelps-Dodge deposit or the San Juan deposit and intervening area. Drill hole locations are shown on Figure 2.

Bohemia Drill Hole Group

The Bohemia group consists of drill holes ES-1, ES-3, ES-5, ES-9, and ES-20, all of which appear to cut portions of the downfaulted fringe of the Phelps-Dodge orebody (Figure 3).

Structure. Displacement on the Butte Fault was determined by comparing the elevation of the contact between the upper and lower units of the older, pre-mineral volcanic series in Essex drill holes with an approximate elevation for the same contact on the opposite side of the fault. The minimum vertical displacement is 2600 feet or 3000 feet measured along the fault plane. Phelps-Dodge drill hole data suggests that the area between Essex holes and the Butte Fault is a graben, possibly as a result of step displacement along several small faults. Consequently the maximum displacement on the fault plane may actually be nearly 4000 feet where it cuts the Phelps-Dodge orebody.

Phelps-Dodge geologic data refers to a Valley Fault that strikes east-west along the northern boundary of Essex' property. This may be correlative with a structure that was encountered in hole ES-9. Other possible evidence for the fault is a 240 foot difference in elevation of the base of the post-mineral volcanics between holes ES-20 and A-75. The fault, if it exists, must be vertical or dipping slightly north because it did not intercept ES-20. This fault by itself would not be an important factor in exploration because of its apparent modest displacement.

Alteration. Both propylitic and biotite alteration are recognized in drill core, with a high chlorite zone comparable to that described by Robinson and Cook occurring at the outer edge of the biotite zone.

Biotite and chlorite are approximately equally abundant and tend to be mutually exclusive within the biotite-chlorite zone. Biotite has a distinct preference for the porphyry units while chlorite is better developed in the more aphanitic tuffaceous units. Bleached quartz-sericite alteration halos to veins are characteristic of this zone.

Mineralogy in the biotite zone is identical to the biotite-chlorite zone except that biotite is much the predominant mineral. Chlorite is stronger only very locally and generally in aphanitic tuffaceous rocks. Bleached halos to veins are much less common.

Typical vein minerals are quartz, calcite, chlorite, biotite sulfides with minor sericite, magnetite, epidote. Quartz, calcite, and sulfides are the principal gangue minerals with chlorite and biotite forming selvages.

Disseminated magnetite is abundant in all biotite altered volcanic rocks and typically varies from 2-5 percent. Its distribution in propylitically altered rocks is weaker and erratic. It is unknown how much of the magnetite is an original constituent of the rocks as compared to hydrothermal in origin. Magnetite is fairly common in veins with quartz and sulfides.

Close correlation between the appearance of biotite alteration and theuupper-lower unit contact in the older volcanics is apparent but may reflect only the depth of mineralization rather than any stratigraphic control. The mushroom configuration of alteration and mineralization zones illustrated on the geologic cross-sections may reflect a damming effect by the agglomerate unit or the lessening of lithostatic confining pressure permitting the fluids to migrate laterally away from the principal fluid channels.

Mineralization. The sulfide mineralogy and distribution is relatively simple. The first indication of sulfides on the columnar sections is the depth at which sulfides were first noted in drill core and is not related to percentages which are sketched on the geologic cross-sections.

Total sulfides may attain 6-8 percent where pyrite occurs in veins and disseminations in the propylitic or biotite-chlorite alteration zones. Sulfide volumes average 2-4 percent below the disseminated pyrite zones. Copper assays tend to change rather abruptly from less than 0.1 percent to 0.2 percent or greater with a corresponding increase in chalcopyrite to pyrite ratio but with little change in total sulfide content. Virtually all significant copper mineralization in Essex holes is restricted to veins and occurs as chalcopyrite.

In contrast with the Phelps-Dodge deposit bornite is only a minor contributor of copper in Essex holes. Covellite and chalcolite are only

locally observed. Molybdenite was quite rare except in ES-20 where some obvious veinlets occurred. Highest molybdenum assay for a 5-foot drill run was 0.018 percent Mo.

Averaged assay intervals are posted on the geologic cross-sections and detailed assay sheets are included as Appendix I.

The correlation between alteration and mineralization is obvious in holes ES-1, ES-5, ES-9, and ES-20. Hole ES-3 does not exhibit good alteration-mineralization correlation because it is on the fringe of the alteration halo. The alteration sequence is from propylitic to biotite-chlorite to biotite. The 0.2 percent copper assay line in holes ES-5, ES-9, and ES-20 coincides very closely with the change from biotite-chlorite to biotite alteration and it is apparent that hole ES-1 penetrated only a short distance into the favorable locus. A progressive sequence from biotite-chlorite to biotite indicates proximity to a mineralized center and significant copper mineralization. Conversely, a regressive alteration sequence from biotite-chlorite to chloritic or propylitic indicates the hole is located on the fringe of the hydrothermal center. An excellent example of the latter is the SJ group of drill holes to be discussed below.

Conclusions. This group of drill holes has defined a zone of low grade copper mineralization on Essex property peripheral to the Phelps-Dodge orebody. Reasonable extrapolation of data confirms that at least a portion of the Phelps-Dodge orebody has been cut by the Butte Fault and displaced onto the unpatented parcel of land designated by the BLM as Tract 37.

SJ Drill Hole Group

The SJ group includes ES-2, ES-4, ES-6, ES-8, and ES-10. Generalized columnar sections of these holes are shown on Figure 4. Hole ES-4 was drilled as an assessment hole on the San Juan property.

Structure. Hole ES-10 did not intercept the Butte Fault thereby establishing that the fault retains a relatively steep dip. The difference in elevation of the upper and lower unit contacts in the pre-mineral volcanics across the fault indicates a fault plane displacement of approximately 3500 feet. Structure in this area appears simpler than to the west because the graben-like structure does not exist.

Alteration. The alteration zones are generally similar to those previously described except that a distinct chlorite zone was recognized in ES-6 and ES-10. Alteration patterns are inconsistent and this is interpreted as representing a fringe area of alteration some distance removed from the center of mineralization. Biotite-chlorite alteration encountered at a shallow depth in hole ES-4 may be related to intrusive material tentatively identified in the hole.

Mineralization. Significant copper oxide mineralization occurs in the upper portions of holes ES-4 and ES-10. Chrysocolla was the only copper mineral visually identified in the oxide zone. There was not good correspondence between estimated grade and the actual assays because the samples were from mud-contaminated rotary drilling. An additional test of this oxide locus utilizing a more accurate sampling method is justified.

The depth of sulfides in these holes varies from 1000 to 1700 feet which is consistently much shallower than in the holes closer to the Phelps-Dodge deposit.

The most abundant sulfide mineral is pyrite which occurs as veins and disseminations. Copper sulfides, principally chalcopyrite with rare bornite and covellite, are scattered in trace amounts throughout the zone of sulfide mineralization. Spot assays taken every fifty feet below a depth of 2000 feet in ES-10 averaged 0.06 percent copper. The highest contained 0.19 percent copper. A strong trend of diminishing copper with depth was indicated.

Conclusions. The alteration-mineralization patterns in these holes represent fringe zone effects from the San Juan deposit. No evidence was seen that would indicate another mineralized center southwest of the Butte Fault in the area of these drill holes.

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DRILL HOLE SAMPLES

HOLE NO. ES-5

Depth	% Cu
2725 - 2730	.06
2777 - 2782	.07
2815 - 2820	.02
2842 - 2847	.30
2902 - 2907	.12
2950 - 2955	.09
3000 - 3005	.01
3048 - 3053	.03
3102 - 3107	.01
3153 - 3158	.03
3205 - 3210	.02
3210 - 3215	.09
3255 - 3260	.01
3300 - 3305	.09
3348 - 3353	.03
3401 - 3406	.07
3449 - 3454	.05
3498 - 3503	.04
3545 - 3550	.16
3603 - 3608	.04
3634 - 3639	.19
3650 - 3655	.07
3678 - 3683	.26
3683 - 3688	.53
3688 - 3693	.28
3698 - 3703	.21
3748 - 3753	.08
3769 - 3774	.13
3774 - 3778	.14
3778 - 3783	.07
3783 - 3788	.11
3788 - 3793	.41
3793 - 3798	.55
3798 - 3802	.31
3802 - 3807	.32
3807 - 3812	.38
3812 - 3817	.32
3817 - 3822	.17
3822 - 3827	.44

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-5 - continued

Depth	% Cu
3827 - 3832	.28
3832 - 3837	.14
3837 - 3842	.09
3842 - 3847	.28
3847 - 3852	.17
3852 - 3857	.22
3857 - 3862	.71
3862 - 3867	.42
3867 - 3874	.20
3874 - 3879	.05
3879 - 3884	.08
3884 - 3889	.11
3889 - 3897	.12
3897 - 3902	.22
3902 - 3907	.10
3907 - 3912	.44
3912 - 3917	.39
3917 - 3922	.13
3922 - 3927	.10
3927 - 3932	.13
3932 - 3937	.18
3937 - 3942	.29
3942 - 3947	.20
3947 - 3952	.31
3952 - 3957	.51
3957 - 3962	.45
3962 - 3967	1.24
3967 - 3972	.43
3972 - 3977	.29
3977 - 3982	.33
3982 - 3987	.12
3987 - 3992	.32
3992 - 3997	1.21
3997 - 4002	.63
4002 - 4007	.39
4007 - 4012	1.29
4012 - 4017	.36
4017 - 4022	.28
4022 - 4027	.12
4027 - 4032	.18

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-5 - continued

Depth	% Cu
4032 - 4037	.40
4037 - 4042	.50
4042 - 4047	.37
4047 - 4052	.49
4052 - 4057	.13
4057 - 4062	.40
4062 - 4067	.10
4067 - 4072	.18
4072 - 4077	.16
4077 - 4082	.47
4082 - 4087	.16
4087 - 4092	.40
4092 - 4097	.24
4097 - 4102	.30
4102 - 4107	.33
4107 - 4112	.19
4112 - 4117	.41
4117 - 4122	.29
4122 - 4127	.45
4127 - 4132	.32
4132 - 4137	.46
4137 - 4142	.13
4142 - 4147	.67
4147 - 4152	.81
4152 - 4157	.33
4157 - 4162	.41
4162 - 4167	.34
4167 - 4172	.17
4172 - 4177	.19
4177 - 4182	.47
4182 - 4187	.24
4187 - 4192	.10
4192 - 4197	.15
4197 - 4262	.20
4202 - 4207	.09
4207 - 4212	.39
4212 - 4217	.19
4222 - 4227	.19
4227 - 4232	.38

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-5 - continued

Depth	% Cu
4232 - 4237	.20
4237 - 4242	.21
4242 - 4247	.29
4247 - 4252	.25
4252 - 4257	.48
4257 - 4262	.15
4262 - 4267	.09
4267 - 4272	.15
4272 - 4277	.25
4277 - 4282	.27
4282 - 4287	1.02
4287 - 4292	.39
4292 - 4297	.64
4297 - 4302	.64
4302 - 4307	.63
4307 - 4312	.43
4312 - 4317	.21
4317 - 4322	.25
4322 - 4327	.16
4327 - 4332	.27
4332 - 4337	.41
4337 - 4342	.21
4342 - 4347	.30
4347 - 4352	.41
4352 - 4357	.11
4357 - 4362	.35
4362 - 4367	.27
4367 - 4372	.17
4372 - 4377	.59
4377 - 4382	.36
4382 - 4387	.50
4387 - 4392	.15
4392 - 4397	.22
4397 - 4402	.30
4402 - 4407	.22
4407 - 4412	.22
4412 - 4417	.31
4417 - 4422	.15
4422 - 4427	.68
4427 - 4432	.26
4432 - 4437	.48
4437 - 4442	.13
4442 - 4447	.57
4447 - 4452	.36

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-5 - continued

Depth	% Cu
4452 - 4457	.27
4457 - 4462	.20
4462 - 4467	.30
4467 - 4472	.34
4472 - 4477	.39
4477 - 4482	.30
4482 - 4487	.48
4487 - 4492	.26
4492 - 4497	.83
4497 - 4502	.60
4502 - 4507	.39
4507 - 4512	.93
4512 - 4517	.26
4517 - 4522	.98
4522 - 4527	1.22
4527 - 4532	.95
4532 - 4537	1.59
4537 - 4542	1.10
4542 - 4547	.49
4547 - 4552	.92
4552 - 4557	.38
4557 - 4562	.40
4562 - 4567	.73
4567 - 4572	.56
4572 - 4577	.44
4577 - 4582	.83
4582 - 4587	.57
4587 - 4591	.91
4591 - 4596	.56
4596 - 4602	1.29
4602 - 4607	.70
4607 - 4612	.59
4612 - 4617	1.08
4617 - 4622	.70
4622 - 4627	.64
4627 - 4632	.60
4632 - 4637	.42
4637 - 4642	1.19
4642 - 4647	1.39
4647 - 4652	.72
4652 - 4657	.41
4657 - 4662	.43
4662 - 4667	.55
4667 - 4672	.56
4672 - 4675	.20

DRILL HOLE SAMPLES

HOLE NO. ES-9

Depth	% Cu
3011 - 3019	.30
3019 - 3026	.05
3026 - 3031	1.62
3031 - 3036	.02
3036 - 3042	.02
3079 - 3084	.03
3084 - 3091	.09
3091 - 3094	.62
3094 - 3103	.03
3194 - 3199	.04
3300 - 3305	.06
3403 - 3408	.03
3498 - 3503	.06
3622 - 3630	.23
3630 - 3639	.15
3639 - 3649	.20
3649 - 3659	.31
3659 - 3665	.07
3665 - 3675	.09
3675 - 3683	.05
3683 - 3690	.10
3690 - 3697	.12
3697 - 3709	.04
3709 - 3716	.03
3716 - 3728	.07
3728 - 3737	.02
3737 - 3749	.07
3749 - 3758	.10
3758 - 3768	.12
3768 - 3777	.23
3777 - 3788	.53
3788 - 3798	1.17
3798 - 3807	.24
3807 - 3817	.27
3817 - 3827	.23
3827 - 3833	.64
3833 - 3843	.48
3843 - 3853	.19
3853 - 3858	.26
3858 - 3863	.13

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-9

Depth	% Cu
3863 - 3870	.11
3870 - 3880	.12
3880 - 3884	.26
3884 - 3890	.23
3890 - 3899	.24
3899 - 3909	.13
3909 - 3919	.37
3919 - 3929	.38
3929 - 3939	.39
3939 - 3947	.31
3947 - 3957	.19
3957 - 3967	.19
3967 - 3977	.28
3977 - 3987	.23
3987 - 3997	.16
3999 - 4007	.12
4007 - 4017	.24
4017 - 4027	.22
4027 - 4037	.21

DRILL HOLE SAMPLES

HOLE NO. ES-20

Depth	% Cu
2800 - 2805	.03
2849 - 2854	.04
2899 - 2904	.03
2949 - 2954	.17
3000 - 3005	.04
3050 - 3055	.05
3100 - 3105	.04
3151 - 3156	.12
3360 - 3370	.68
3370 - 3380	.71
3380 - 3390	.69
3390 - 3399	.62
3399 - 3409	.54
3409 - 3419	.62
3419 - 3429	.68
3429 - 3439	.87
3439 - 3447	.11
3447 - 3453	.06
3453 - 3461	.48
3461 - 3471	.39
3471 - 3480	.46
3480 - 3490	.25
3490 - 3500	.44
3500 - 3510	.50
3510 - 3520	.43
3520 - 3530	.96
3530 - 3540	.51
3540 - 3550	.19
3550 - 3560	.48
3560 - 3570	.29
3570 - 3580	.76
3580 - 3593	.75
3593 - 3601	.76
3601 - 3611	.56
3611 - 3621	.32
3621 - 3630	.32
3630 - 3640	.36
3640 - 3650	.50
3650 - 3660	.26
3660 - 3671	.26
3671 - 3682	.24

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-20 - continued

Depth	% Cu
3682 - 3689	.15
3689 - 3699	.32
3699 - 3709	.38
3709 - 3719	.52
3719 - 3729	.25
3729 - 3739	.41
3739 - 3749	.46
3749 - 3759	.32
3759 - 3769	.31
3769 - 3779	.29
3779 - 3785	.35
3785 - 3795	.19
3795 - 3799	.11
3799 - 3809	.34
3809 - 3819	.15
3819 - 3829	.20
3829 - 3839	.15
3839 - 3847	.31
3847 - 3859	.19
3859 - 3869	.38
3869 - 3879	.29
3879 - 3889	.20
3889 - 3899	.16
3899 - 3909	.58
3909 - 3919	.21
3919 - 3929	.16
3929 - 3939	.16
3939 - 3949	.28
3949 - 3959	.33
3959 - 3969	.44.
3969 - 3979	.23
3979 - 3989	.25
3989 - 3999	.38
3999 - 4009	.14
4009 - 4019	.18
4019 - 4029	.20
4029 - 4039	.47
4039 - 4049	.37
4049 - 4059	.18
4059 - 4069	.55
4069 - 4079	.29

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-20 - continued

Depth	% Cu
4079 - 4089	.60
4089 - 4095	.23
4095 - 4105	.21
4105 - 4115	.18
4115 - 4125	.41
4125 - 4135	.24
4135 - 4145	.16
4145 - 4155	.09
4155 - 4165	.64
4165 - 4175	.20
4175 - 4183	.40
4183 - 4192	.26
4192 - 4195	.35
4195 - 4205	.21
4205 - 4215	.40
4215 - 4225	.21
4225 - 4235	.18
4235 - 4245	.12
4245 - 4255	.37
4255 - 4265	.59
4265 - 4275	.36
4275 - 4284	.29
4284 - 4292	.12
4292 - 4299	.24
4299 - 4309	.34
4309 - 4319	.11
4319 - 4329	.16
4329 - 4338	.41
4338 - 4345	.25
4345 - 4355	.57
4355 - 4364	.45
4364 - 4374	.25
4374 - 4384	.26
4384 - 4394	.45
4394 - 4404	.31
4404 - 4414	.18
4414 - 4423	.19
4423 - 4433	.10
4433 - 4443	.12
4443 - 4453	.13
4453 - 4463	.30

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-20 - continued

Depth	% Cu
4463 - 4472	.37
4472 - 4482	.22
4482 - 4492	.18
4492 - 4500	.18
4500 - 4510	.07
4510 - 4520	.07
4520 - 4528	.13
4528 - 4535	.24
4535 - 4545	.38
4545 - 4555	.10
4555 - 4565	.16
4565 - 4575	.20
4575 - 4585	.25
4585 - 4595	.20
4595 - 4605	.31
4605 - 4615	.18
4615 - 4625	.28
4625 - 4635	.27
4635 - 4645	.21
4645 - 4647	.15
4647 - 4655	.22
4655 - 4665	.26
4665 - 4675	.25
4675 - 4685	.40
4685 - 4695	.16
4695 - 4705	.19
4705 - 4715	.32
4715 - 4725	.53
4725 - 4731	.16
4731 - 4740	.32
4740 - 4750	.15
4750 - 4760	.44
4760 - 4770	.23
4770 - 4774	.12
4774 - 4784	.12
4784 - 4790	.18
4790 - 4795	.14
4795 - 4802	.08
4802 - 4812	.11
4812 - 4821	.17
4821 - 4827	.30

Continued -

DRILL HOLE SAMPLES

HOLE NO. ES-20 - continued

Depth	% Cu
4827 - 4833	.09
4833 - 4838	
4838 - 4848	.17
4848 - 4858	.18
4858 - 4868	.16
4868 - 4878	.17
4878 - 4880	.12
4880 - 4890	.15
4890 - 4900	.16
4900 - 4910	.22
4910 - 4920	.23
4920 - 4930	.22
4930 - 4940	.10
4940 - 4950	.12
4950 - 4960	.16