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Kinnison

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Aa-16A.2.0

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 27, 1961

Kenyon E. Richard, Chief Geologist
American Smelting and Refining Company
Tucson, Arizona

Poston Butte Drilling Project
Blackwater Mining District
Pinal County, Arizona

Dear Sir:

Following is my report on the subject project:

REVIEW

Drilling was started at Poston Butte on the 10th of January, 1961, and a total of 3268 feet was drilled in seven holes. Drilling was stopped on April 8th, 1961.

Poston Butte was first recognized as a porphyry copper prospect during reconnaissance mapping by Kinnison and Blucher in the spring of 1960. Initially the prospect consisted of a very small outcrop at the base of a basalt capped hill on the northwest outskirts of Florence, Arizona. Because the granite exposed in this outcrop was pervasively altered and contained moderate amounts of limonite after chalcocite, a geophysical survey and a limited drilling program was recommended (see Report on Blackwater and Poston Butte Prospects).

In the month of August Mr. L. K. Wilson completed a property study of the area, and in September and October a preliminary geophysical survey was made by Mr. W. E. Saegart. Induced Polarization, Resistivity, and Magnetometer readings were taken over a wide area, and the area of potential interest; i.e., anomalous readings indicative of appreciable amounts of sulfide under relatively thin cover, was restricted to the ground around the butte and extending about 4000 feet to the west (see Preliminary Geophysical Report, Poston Butte Property). A discussion by Mr. Saegart of the relationship between this interpretation and the actual drilling results is included below in the section headed Geophysical Considerations.

During the fall of 1960 claims were staked on the federal and state ground in the vicinity of the butte, and an option was taken on the C. W. England farm just southwest of the butte. By January 1st, 1961, the Company controlled, by claims or option, an area of more than seven square miles around Poston Butte. (see Attachments A and C)

The first hole was drilled in the discovery outcrop and encountered moderate amounts of disseminated and veinlet sulfides --- mainly pyrite with very weak chalcopyrite and some chalcocite replacing pyrite. Although this hole showed only two short intercepts of ore grade material, it confirmed the geologic interpretation of the outcrop and lent some weight to the geophysical interpretation of the prospect. (see Att. B)

Drillholes PB 2 and PB 3 were located in the interior of the geophysical anomaly and encountered disseminated pyrite with very weak chalcopyrite in monzonite porphyry. There was little or no secondary enrichment. The highest assays were less than 0.25% Cu.

Drillholes PB 4 and PB 5 were drilled in an attempt to positively limit the zone of alteration. PB 4 was located about 1500 feet out from the southern edge of the 6 mv/v contour and encountered altered granite and monzonite porphyry with weak disseminated sulfides under 267' of cover. PB 5 was located nearly 2000 feet west of the western edge of the 6 mv/v contour and encountered sulfide mineralization as pyrite, chalcopyrite, and chalcocite beneath 341' of cover. Although it encountered only 20' of secondarily enriched sulfides averaging 0.84% Cu, the primary copper sulfides beneath this enriched zone make it by far the most significant hole in terms of further exploration possibilities.

Drillholes PB 6 and PB 7 were drilled to test the northern and eastern limits of the altered and mineralized zone. Both of these holes encountered desseminated pyrite and very weak chalcopyrite with only incipient enrichment by chalcocite. The mineralization in PB 6 was beneath 680' of post-mineral conglomerate and gravels.

SUMMARY AND RECOMMENDATIONS

None of the seven holes cut economic segments of porphyry copper ore. However, all cut porphyry copper type mineralization. The holes drilled with the specific intent of limiting the altered area to a minor mineralized zone encountered disseminated sulfides extending well beyond the original target anomaly. PB 5, the hole with the best primary and secondary copper mineralization, is nearly 1/2 mile west of PB 2 and about 1 mile from the discovery outcrop. There is little doubt that these drillholes have penetrated a large altered and mineralized zone of unknown limits.

In the eastern half of the prospect drillholes PB 1, 2, 3, 4, 6, and 7 are sufficiently close-spaced to preclude the existence of a large zone of secondary enrichment, and to render extremely doubtful the possibility of a large zone of primary ore. To the east and south there are no bedrock outcrops, and drilling has not found the limits of alteration. The possibility of other porphyry intrusives and attendant copper mineralization exists, but there are no definite leads and no further drilling is warranted in these areas.

In the western half of the prospect the only drill hole is PB 5. The primary mineralization both in the porphyry and granite and in the diabase is uniform and approaches 0.3% Cu. There is evidence in the capping that an ore grade secondary blanket previously existed and has been partly oxidized except for the lower 20'. This drillhole presents a definite exploration target.

This drillhole is less than 500 feet from the southern boundary of the property controlled by the Company at this point. It is about 4000 feet from the western edge of the property. Further drilling in the vicinity of PB 5 must be contingent on the acquisition of the E. W. McFarland property south of the drillhole. Consideration should be given to the possible need for more ground to the west.

I recommend further Company exploration activity in the following order: (1) Acquisition of the McFarland property; (2) Extension of I. P. traverses on McFarland's ground to the south and Company ground to the west;

and (3) A drilling program to test the ground in the vicinity of PB 5 and any extensions indicated by further geophysical exploration.

DRILLING AND SAMPLING PROCEDURES

The drilling program was contracted to Boyles Bros. of Salt Lake City, Utah. Most of the Drilling was done with a truck-mounted diamond drill using a 4-3/4 inch tricone bit in the overburden, and an NX diamond bit with a wire-line, swivel-type core barrel in coring bedrock. A part of the overburden drilling was done with a Portadrill rotary rig and with a Failings rotary rig.

All sampling was handled by a Company employee who also acted as the Company's representative at the drill and exercised some supervision as provided for in the terms of the contract.

During overburden drilling character samples were taken in ten foot segments of all rockbit cuttings, and any sharp change in drilling conditions was noted on the Sampler's Shift Report.

When bedrock was reached N casing was placed and coring was started with an NX diamond bit. All of this core was split --- one half furnishing a sample for assay and the other half being retained as a permanent record. Each coring run was treated as an individual sample,and, although, this interval was in some cases as short as one foot or as long as nine feet, the average length of sample was about four feet.

Assaying was done by Jacobs Assay Office in Tucson. Core was split at the rig and samples were taken in for assay at the end of each day. In order to provide early information as to the values encountered Jacobs was asked to assay as soon as possible the last sample of each days drilling. Usually this result was available by 2:00 P.M. on the day following.

At the end of each hole composite samples were made of selected segments of the hole, and assays were run for gold, silver, and molybdenum. The percentage of total sulfides was determined by mechanical separation of sulfides in these composites. The core and sample pulps were scanned with a scintillator after storage at the Mission Lab.

GEOLOGY

General

The regional geologic setting of the Poston Butte Prospect was described in some detail in the Report on Blackwater and Poston Butte Prospects of June, 1960. Geologic data gathered at that time and previously, during regional mapping in the Globe-Superior Area, has been supplemented recently by mapping in the Price area east of Florence and the Sacaton area north of Casa Grande. This progressive accumulation of data, although still incomplete, can be related to form a reasonably clear picture of the geologic history of the western extensions of the Ray and the Globe-Superior regional mineral trends. A summation can, however, best be made on completion of work in the Sacaton area, and only the immediately pertinent features will be treated here.

The Poston Butte altered zone is near the midpoint of a major structural lineament extending in a S 65 W direction from Ray, Arizona to and possibly beyond Casa Grande, Arizona. The westernmost mineralized outcrop, our Sacaton Prospect, is nearly fifty miles west of Ray.

Outcrops are relatively scarce in the western half of this mineral belt and much of the area is covered by post-mineral conglomerates, volcanics, and alluvium. Both Poston Butte and the new Sacaton Prospect are outcrops only by virtue of a slight elevation above the surrounding buried pediment.

Pre-mineral Rocks

Present geologic information at Poston Butte consists of one small group of bedrock outcrops and seven drill penetrations. (see Att. B) This meager information is such, however, as to suggest a fairly simple geologic interpretation. The interior drillholes, PB 2 and PB 3, penetrated only monzonite porphyry. The exterior drillholes, PB 4, 5, 6, and 7, encountered granite and monzonite porphyry --- principally as small dikes. It would appear from this that the mineralization and alteration at Poston Butte is related to and surrounds an elongate, E-W trending monzonite porphyry stock intruding coarse-grained granite. This does not exclude the possibility that the stock and satellitic dikes are but one of several monzonite porphyry intrusives beneath the Gila gravels west of Florence.

The rock termed "granite" at Poston Butte is a coarse-grained equigranular rock with very large phenocrysts of orthoclase feldspar. It is similar to other granites of the region which have been classified as Precambrian in age. Whereever it was encountered in drilling it displayed uniform grain sizes and about the same proportion of quartz phenocrysts, feldspars, and mafic minerals.

The monzonite porphyry at Poston Butte is a much less uniform rock both in texture and composition. Feldspar phenocrysts are irregular in size and quantity. The groundmass is usually gray and aphanitic or very fine-grained. In some places quartz phenocrysts are so abundant as to make it a quartz monzonite porphyry. It closely resembles the porphyry in the San Manuel porphyry copper deposit. Where small dikes of this porphyry intrude the granite the percentage of phenocrysts is much smaller.

In PB 1 and PB 5 a fine-grained diabase was encountered. Because PB 5 was the only drillhole to intersect significant amounts of primary copper values and some of these values were in the diabase, an effort was made to ascertain differences between this diabase and the diabase in PB 1 which was only weakly mineralized. Except for the presence of chalcopyrite the rocks and the alteration appear to be similar.

Post-mineral Intrusives

Post-mineral dikes occur in at least two places on the property. In the bedrock outcrops there is an andesite porphyry which intrudes the granite and the post-mineral conglomerate. In PB 2 an andesite dike cutting the mineralized porphyry is completely barren and, presumably, later than the mineralization.

Post-mineral Layered Formations

Conglomerate --- The oldest post-mineral formation in the area is a poorly sorted conglomerate of igneous fragments---mainly granitic---in a silty matrix. It is exposed in the bedrock outcrops where it overlies the mineralized granite and dips about 30 degrees east. It was encountered in some of the drillholes through the Gila gravels but was absent in parts of the area where the gravels lie directly on pre-mineral bedrock. The occurence of rhyolite fragments in most of this conglomerate indicate an age younger than the dacite-rhyolite period of volcanic activity.

Walker Butte Basalt --- The basalt capping Poston Butte is of two types. The lower flows are bluish-gray or black and massive. These are overlain by flows which are black or purplish and vesicular and scoraceous. This rock was not encountered in drilling and the slightly tilted cap of the butte appears to be a remnant with no buried extensions beneath the gravels.

Gila River Gravels and Terraces --- The Gila River gravels on the Poston Butte Prospect reach a maximum thickness of about 350 feet. Where stratification can be recognized it parallels the present very gentle slope of the land surface. On most of the property the upper 5 or 10 feet of soil and silt are underlain by a bed of very hard and well rounded pebbles and cobbles which appear to be derived almost entirely from the late Precambrian Apache sediments. This bed thins to the west and thickens to the east with an average thickness of about 40 feet. Beneath this are varying thicknesses of sand and clay with a few pebble beds. The lowermost 5 or 10 feet usually consists principally of basalt fragments.

Secondary Enrichment

The proposal to test the Poston Butte Prospect was based on the recognition of the small bedrock outcrops as being part of a much wider area of disseminated mineralization. Although the possibility of a primary orebody was considered, the principal exploration target was a secondarily enriched chalcocite blanket. The largest question here, beyond the question of primary grade and areal extent, was whether the post-mineral history was such that a chalcocite blanket might have developed and endured.

Of the seven drillholes only two, PB 1 and PB 5, encountered appreciable amounts of chalcocite replacing pyrite. A third hole, PB 2, cored leached capping with excellent veinlet and disseminated limonite after chalcocite before entering primary sulfides with only very small amounts of chalcocite. These three intercepts are significant features.

Four post-mineral erosion surfaces are evident; the base of the conglomerate, the base of the basalt, the base of the Gila River gravels, and the present surface. That other erosional intervals might have occurred can be deduced from the absence of several of the older conglomerates and flows which probably covered this area at one time. Effectively, however, these older surfaces would be punctuations in the erosional interval which produced the oldest surface recognized here---the base of the conglomerate.

The four recognized erosion surfaces are discussed below:

The conglomerate surface --- Detrital material in the lower parts of the conglomerate is derived from a mineralized zone---either this or an adjacent one. The lack of sorting, as well as the character of the fragments, suggests a very local basin draining from a rapidly eroding highland to the west. The successive beds of clay encountered in PB 6 suggest "playa" conditions to the east.

The basalt surface --- The base of the basalt dips in about the same direction as the underlying conglomerate at about 10 degrees flatter angle. The base is nowhere clearly exposed. Probably the basalt flows covered a fairly even surface of the still young, but slightly deformed, conglomerate. Possibly the altered pre-mineral bedrock was not exposed.

The Gila River surface --- By the time of the deposition of the Gila gravels the land surface was similar to the present topography. The Gila River, following its present course but with a much larger flood plain, flowed through a region of gentle topography flanked by basalt capped hills of tilted conglomerate or exposed pre-mineral bedrock. Along its wide bed was deposited sand, silt, clay, and very hard, well rounded pebbles.

The present surface --- Because the present water table is everywhere above the level of oxidation and little or no erosion of bedrock has taken place since the deposition of the Gila gravels, a discussion of this surface is not pertinent.

As can be seen from the above discussion the mineralized porphyry and granite at Poston Butte may have been protected from oxidation, and consequently from enrichment, almost continuously since the deposition of the conglomerate. These same conditions would likewise have preserved any chalcocite developed prior to the deposition of the conglomerate. However, the only evidence of appreciable secondary enrichment encountered in drilling was in the three intercepts mentioned in the first paragraph of this section as being significant features. My interpretation of these features is as follows:

Any chalcocite zone which might have developed over the very low grade protore in the western half of the area was removed by pre-conglomerate erosion. The chalcocite in PB 1 was the result of enrichment during recent times along the bedrock ridge beneath the butte. The fairly thick section of chalcocite and partly oxidized chalcocite remnants in PB 5 on the western end reflects either thicker pre-conglomerate enrichment or less pre-conglomerate erosion or both. The much better grade (0.3%) protore certainly should produce better secondary enrichment than that in the eastern end. The chalcocite-limonite in PB 2 in the central part of the area suggests thatpre-conglomerate truncation may have been less thorough in a westerly direction. It would appear, then, that the possibility of secondary enrichment in the eastern end is slight, but that a chalcocite blanket probably developed and might still exist beneath the gravels to the west.

Alteration

Most of the granite and monzonite porphyry cored at Poston Butte is only moderately altered; i.e., partial sericitization of the feldspars, pyritization and chloritization of the mafic minerals, and the development of occasional quartz veinlets. In places gypsum veinlets cut mineralized veinlets but are themselves also weakly mineralized.

In the core from the holes which penetrated monzonite porphyry the alteration varies rhythmically from fairly strong sericitization and nearly and complete destruction of the mafic minerals to weak sericitization and nearly fresh book biotite. No clear relationship between the degree of alteration and the abundance of sulfide is apparent.

This same rhythmic variation is observed in the granite, but the changes are more extreme and sulfide mineralization appears to vary directly with the intensity of alteration. This is particularly pronounced in PB 1 where short segments of core show nearly fresh granite with weak disseminated sulfides, and deeper in the hole, the granite near the porphyry contact is almost unrecognizable as a result of silicification and chloritization with very heavy pyrite.

No detailed petrographic or alteration studies were made. In general it can be said that the degree of alteration at Poston Butte is less than that usually found associated with porphyry copper deposits but is similar to the alteration in parts of the San Manuel orebody.

Mineralization

Most of the mineralization in the porphyry and granite at Poston Butte consists of pyrite with very minor amounts of chalcopyrite and occasional molybdenite.

In the altered granite the pyrite occurs as discrete grains, as intergrowths with partly altered mafic minerals, and as irregular veinlets and vugs as much as several inches thick.

In the monzonite porphyry the pyrite occurs mainly as discrete grains and threadlike stringers with only an occasional veinlet or vug.

In the porphyry the sulfide minerals are very evenly distributed and seldom exceed 4% total sulfides. In the granite only the discrete grains and intergrowths are evenly distributed. The 5 or 6% total sulfides in the granite cut by drillholes PB 1, 6, and 7 reflects the presence of thick veinlets and vugs of pyrite which are probably associated with the eastern contact of the porphyry intrusive. The percentage of sulfides in the mass of the altered granite may be nearly the same as that in the porphyry.

The minor amounts of chalcopyrite and molybdenite in the granite and porphyry of the eastern half of the prospect furnish little evidence on which to base speculations as to the distribution of values. If primary mineralization alone is considered, both copper and molybdenum appear to diminish in an easterly direction, and the easternmost hole, PB 6, is almost barren, though heavily mineralized with pyrite.

In the western half of the prospect only drillhole PB 5 has tested pre-mineral bedrock. This single penetration would hardly suffice as a basis for projected mineral possibilities were it not for the fact that the bottom 73' of this hole encountered very evenly distributed copper values averaging 0.25% Cu. The primary copper sulfides found here are not localized along structures or rock contacts but are suggestive of an extensive body of disseminated copper mineralization.

GEOPHYSICAL CONSIDERATIONS

Certain features of the geologic environment at Poston Butte resulted in the need for special geophysical techniques, both in application and interpretation. These techniques were developed and modified during the course of the survey and, of necessity, some of the information gained by these methods was not available until after the drilling was nearly completed. However, the early work successfully outlined the heavier disseminated mineralization in the eastern end of the area. Complete information in the western end must await the time when more traverses can be run over the E. W. McFarland ground southwest of PB 5. Mr. Saegart discusses these results in the following indented paragraphs.

> As Mr. Blucher states above, the early work using 400' "a" spacings indicated only the shallow sulfides close to the butte. The results of our 1000' "a" traversing reflect deeper sulfides which occur south and west of the butte in addition to the shallow mineralization. The discussion and correlations which follow pertain only to I.P. results obtained with the larger spacing.
>
> In the table which follows, the drillholes are grouped on the basis of the I.P. interpretation in my memo on February 27 (refer to attachment D enclosed). Data on % sulfides and depth to sulfides are also tabulated below for purposes of correlation.

Group	Hole Nos.	I.P. Response	I.P. Interpretation (Feb. 27)	Hole No.	Depth to			Avg. % Sulfide
					Bedrock	Top of Sulfides	Base of Oxidation	
		Orange Colored Area						
A	1,2,3 & 7	Above 5 mv/v↑*	Weak to	1	0	208	228	6.5 & 3.9
		Above 6 mv/v↓*	Moderate	2	355	385	395	3.0
			Sulfides	3	228	282	Same	3.5
				7	160	245	255	5.0
		Yellow Colored Area						
B	4 & 6	Above 4 mv/v↑	Minor to nil	4	267	325	340	2.0
		Above 5 mv/v↓	Sulfides	6	680	740	Same	7.0
C	5	No I.P. coverage (with 1000' "a")	Assumed outside of anomalous area	5	341	365	480	5.0

> * ------ ↑ refers to that portion of the anomaly north of the main road between the butte and England's property; ↓ refers to that portion of the anomaly south of the road. A distinction is necessary because of the change in I.P. background due to polarizing alluvium in the Gila River channel (described in previous memoranda). 5 m.v./v. response north of the road is interpreted as being equivalent to 6 m.v./v. south of the road.

Group A Orange Colored Area (attachment D)

The sulfides indicated in PB 1, 2, 3, and 7 confirm the geophysical interpretation of the orange colored area.

Group B Yellow Colored Area (attachment D)

Sulfides apparently do contribute to the weak polarization in the yellow colored area. There are only two holes in this intensity range, PB 4, and PB 6. Correlating the I. P. with the tabulated data from these holes suggests (1) the I.P. intensity decreases to the south because of decreasing total sulfide content (2% in PB 4) and (2) the decrease in I.P. intensity to the east is related to an increasing depth of bedrock in that direction (680' in PB 6).

Interpretation of I.P. response in the yellow colored interval is probably not justified despite the apparent sulfide correlation. I.P. background from extraneous sources approaches this magnitude of response. Any attempt to evaluate 4 m.v./v.↑ or 5 m.v./v.↓ could lead to expensive mistakes. For this reason, in the Poston Butte Area, the "minimum interpretable response" is assumed to be 5 m.v./v. and 6 m.v./v. .

Group C

Hole 5 is located 1/4 mile west of the limit of our survey coverage with the 1000' "a" spacing. Although the early work (400' "a") covered this area, the sulfide depth is beyond the limits of detectibility with the shorter spacing. The most westerly 1000' "a" traverse (along the line between sections 27 and 28) apparently terminated the anomaly as the maximum response was below 6 m.v./v. As a result, our coverage with 1000' "a" spacing was not advanced farther to the west.

When it was discovered that the sulfide content in PB 5 averaged 5%, we ran an I.P. depth profile over the hole for correlation purposes. The expander showed moderate polarization (8-9 m.v./v.) with an indicated source depth of 300'. This is short of the top of sulfides, but close enough to demonstrate a probable sulfide correlation.

As a follow-up of the depth profile, we ran a north-south 1000' "a" traverse over PB 5. Results of this traverse are shown in profile on attachment E. There can be little doubt that the anomalous portion of the curve does reflect sulfides. Another north-south traverse was then made 1/4 mile farther west. A similar, but somewhat weaker I.P. anomaly with a maximum response of 7.8 m.v./v. was recorded on the second traverse. Additional traverses in this area cannot be made without the consent of the property owner, E. W. McFarland.

Attachment F shows the interpreted limits of significant response obtained on all of the 1000' "a" traverses. The location of the west anomaly (traverses C-w and D-w) appears to be offset from the anomaly which includes the butte. If there is continuity across the B-w traverse it is not reflected in the I.P. results. The attention of all concerned is directed to the apparent strike of the west anomaly.

If exploration of the Poston Butte area is continued, additional I.P. traversing might be considered. The following three factors should influence any decision concerning additional I.P. coverage.

(1) Based on existing correlations we can expect, in this area, interpretable I.P. response from plus 5% sulfides to depths of 500'.

(2) We are now satisfied that polarization sources in the bedrock can be differentiated from polarization within the alluvium by comparing results of the two spacings.

(3) I.P. traversing across cultivated land would be expensive during the summer. The best time would be after all the cotton is picked---about December 15---and before the grain is planted in the spring.

W. E. SAEGART

EXPLORATION POSSIBILITIES

The drilling program at Poston Butte has demonstrated the following: (1) In the eastern half of the area primary and secondary copper mineralization is very weak, and no further drilling is justified. (2) The extension of this alteration beneath deepening cover to the south and east furnishes no immediate exploration possibilities. (3) The copper mineralization encountered in PB 5 in the western half of the area definitely deserves further exploration by drilling.

There are no bedrock exposures or drillholes near enough to PB 5 to give appreciable aid in planning further drilling. The very limited geophysical information presently available suggests a southwest trending zone about 2000' wide by 4000' long and centered roughly on PB 5. It would extend at least several hundred feet into the E. W. McFarland property. Post-mineral cover would range from about 300' in the northeast to about 400' in the southwest. Until additional geophysical traverses can be run this mineralized zone must remain very imperfectly outlined and open on the western end.

Yours very truly,

ORIGINAL SIGNED BY
ARTHUR G. BL HER, JR.

ARTHUR G. BLUCHER, JR.

AGB/z

Appendix

DRILLING

This contract was handled under a letter agreement with Boyles' District Manager, Mr. J. E. Roberts, to overate within the general terms of their Silver Bell drilling contract (Jan. 6, 1960). Although drilling conditions at the two properties are quite different, this agreement worked out very well during the relatively short term of the project. The major difference in conditions, the existence of an unknown depth of alluvium and gravels at Poston Butte, was provided for by the specification in Mr. Roberts' letter of a price of $2.60 per foot for rockbit drilling.

The general terms of the contract are as follows:

(A)

	AX	BX	NX	NC
At depths of 0 to 500 feet	$4.60	$4.90	$6.00	$7.00
At depths of 500 to 1000 feet	5.60	5.80	6.90	

(B)

For reaming, if required, $17.60 per hour.
For casing, cementing, or delays not caused by the contractor, $11.60 per hour.

(C) The Company to pay the contractor at cost delivered to the job site for cement and mud ingredients used, and for any casing left in place.

At the beginning of this project little was known of the thickness and drilling characteristics of the Gila river gravels or the character of the underlying bedrock. Because of this and because of the small amount of drilling footage involved, the contractor was allowdd wide discretionary freedom in the choice of equipment and drilling techniques. Some of the safeguard clauses of the Silver Bell contract, such as the Company's option to furnish the contractor with cement and mud ingredients, or to require the use of rubber water-shutoff washers, were not exercised. However, core recovery was maintained above a satisfactory minimum, and records were kept by the Company on the relationships between the type of bit used and the percentage core recovered, and between the drilling mud used and the viscosity and sand content of the sludge. In the event an extensive drilling program should evolve at this or other prospects having similar drilling conditions these records and observations would be useful. They are briefly outlined in the following paragraphs.

Mud Control---During the drilling of the first hole no checks were made of the viscosity and sand content of the drilling mud and no additives such as Quebracho or caustic were used to condition the mud. This necessitated the frequent changing of mud and resulted in a cost to the Company of about $20 per shift for mud and mud mixing time. At the start of the second drillhole a simplified system of mud control was installed. This involved three checks---viscosity, sand content at the pump intake, and sand c ontent at the collar of the hole---and the use of Quebracho and/or caustic to control the viscosity and settling rate of the cuttings. This resulted in some saving in mud costs and produced the following data.

(1) At viscosities greater than 55 seconds (measured with the Marsh funnel) there was very little settling and a rapid increase in sand content. The addition of an extra tank in the settling system did not appear to increase the settling percentage in mud of this or higher viscosities.

(2) With the high volume pumps of the Portadrill or Failings drill mud of viscosities less than 40 seconds would effectively remove cuttings from the hole. With the small pump of the diamond drill very high viscosities (60 to 80 sec.) are necessary when rockbitting below about 200 feet.

(3) Although the effect of a given quantity of Quebracho and caustic varied greatly with different brands of mud or different drill-holes, the best mixture was generally 1 qt. Quebracho and 1 cup of caustic to 2 sacks of Bentonite.

(4) No difficulties with viscous mud blocking the small clearances in the core barrel (such as was mentioned in the Mission Drilling and Sampling Report) were encountered; however, some brands of mud tended to collect on the joints of the rods making it difficult to get the overshot into the hole to retrieve the rods.

(5) High sand content appears to result in high water loss due to the formation of a very porous mud "wall". It is likely that fluid loss in the overburden drilling in PB 6 caused the swelling of clay beds and the loss of the lower 17 lengths of casing.

(6) of the various brands of mud used Baroid's Aquagel was the most satisfactory.

Relation of core recovery to type of bit--- In good coring ground---moderate to hard, homogeneous, and not intensely fractured---core recovery with conventional bits was comparable to core recovery with face discharge bits. In soft ground---particularly in gouge with hard fragments---core recovery was much higher with face discharge bits. Because of much higher bit and diamond costs with the face discharge bits the contractor was allowed to use conventional bits except in cases where core recovery fell below 60% or where important rock contacts and ore intercepts coincided with zones of soft ground.

Coring NC with N casing for core barrel--- In rockbitting through alluvium and conglomerates it was sometimes difficult to determine whether the material being drilled was indurated conglomerate or bedrock. Several attempts were made to get core samples by removing the rock bit and coring with an NC bit using a length of N Casing as a core barrel. In several cases conglomerate core was successfully retrieved, but in no case was altered and fractured bedrock successfully cored. This failure was principally due to excessive vibration and to the ineffectiveness of "dry blocking" to lift core in place of core lifters.

Comparison of diamond drill to Portadrill or Failings drill in drilling overburden--- The principal difficulty in drilling the Gila gravels was encountered in the upper bed of hard, loose pebbles. Mud circulation was not successful in preventing caving and only repeated cementing with Calseal or Lumnite was effective. The diamond drill made better progress in drilling these pebbles than the rotary drills, probably because the smaller volume of drilling fluid and the gentler drilling technique resulted in less collapse and cave of the loose pebbles. Below the pebble bed the rotary rigs were slightly faster. The principal disadvantages in using the diamond drill for rockbit drilling are: (1) The maximum practical depth appears to be about 400'. (2) The viscosity of the mud must be kept above desirable limits. (3) The very small cuttings give poor geologic information. (4) The rate of drilling is slightly less and the wear on the equipment more than with the heavier rotary drills.

Comparisons of costs--- No detailed study of the cost to the Company or the cost to the contractor have been made. The following figures are fairly accurate approximations.

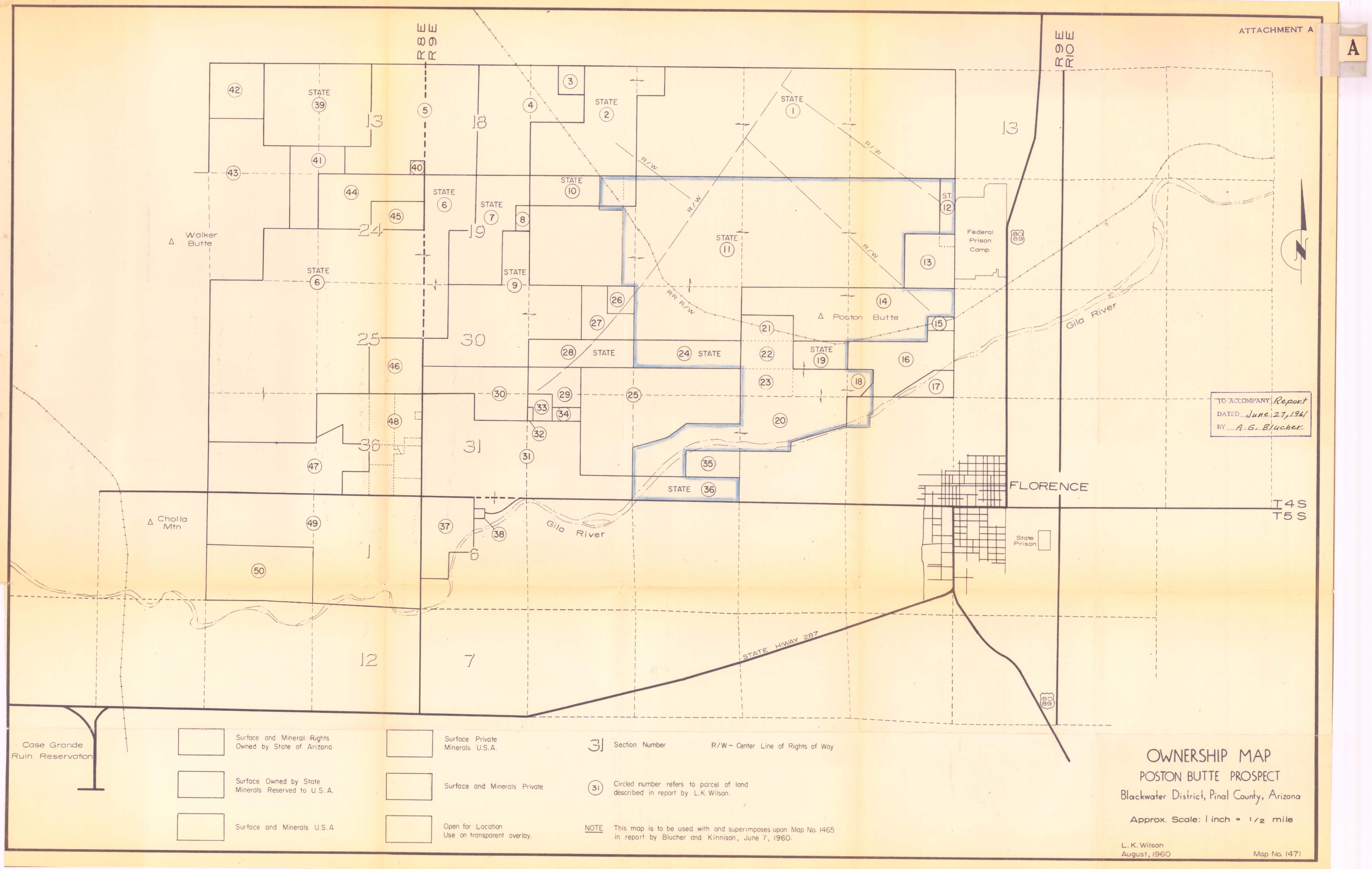
The total cost to the Company for the drilling project was $21,586 for 3268 feet or about $6.60 per foot average cost for rockbitting and NX coring. Of this $4.90 was direct (contract) cost and $1.70 indirect cost. Of the contract cost about 80% was for footage drilled and 20% for mud, cementing, delays, etc.. Of the total footage drilled 2080 feet were rockbit ($2.60) and 1188 feet were NX coring ($6.00). Because the cost of mud, cement, and delays was slightly higher during rockbitting, the total contract cost for rockbitting was about $3.80 per foot compared to $6.80 per foot for NX coring. Considering indirect costs to be the same for rockbitting and coring, the total costs to the Company are approximately $5.50 per foot for rockbitting and $8.50 per foot for NX coring.

By using the figures in the Boyles Bros. cost sheet attached to J. H. Courtright's memorandum on the Silver Bell drilling contract an approximation can be made of Boyles' costs at Poston Butte. Considering costs to be the same at both properties except for labor and diamond loss, and using a calculated labor cost of $1.65 per foot and an estimated diamond cost of $1.25 per foot produces a cost per foot to Boyles for NX coring at Poston Butte of $6.12. This compares to $6.80 per foot contract cost to the Company and shows a moderate profit.

No estimate can be made of bit costs to Boyles Bros. for rockbitting; however, the footage drilled per shift while rockbitting was only 56 feet. This is quite low in comparison to footage per shift drilled by Boyles Bros. at Cholla Flat and probably represents little or no profit.

ATTACHMENT A

A



☐ Surface and Mineral Rights Owned by State of Arizona

☐ Surface Owned by State Minerals Reserved to U.S.A.

☐ Surface and Minerals U.S.A

☐ Surface Private Minerals U.S.A.

☐ Surface and Minerals Private

☐ Open for Location Use on transparent overlay.

31 Section Number

R/W – Center Line of Rights of Way

㉛ Circled number refers to parcel of land described in report by L.K. Wilson.

NOTE This map is to be used with and superimposes upon Map No. 1465 in report by Blucher and Kinnison, June 7, 1960.

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

OWNERSHIP MAP
POSTON BUTTE PROSPECT
Blackwater District, Pinal County, Arizona

Approx. Scale: 1 inch = 1/2 mile

L. K. Wilson
August, 1960

Map No. 1471

ATTACHMENT E

C.W England Well
churn drilled April, 1961
Encountered altered
granite w/py @ 390'

Indian Service Well
deepened April, 1961.
Encountered altered
granite w/py @ 302'

Post Mineral Rocks

☐	Alluvium
▨	Gila River Gravels
☐	Basalt
▨	Conglomerate

Pre Mineral Rocks

▨	Monzonite
▨	Diabase
▨	Granite

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

DRILLING MAP
POSTEN BUTTE PROSPECT

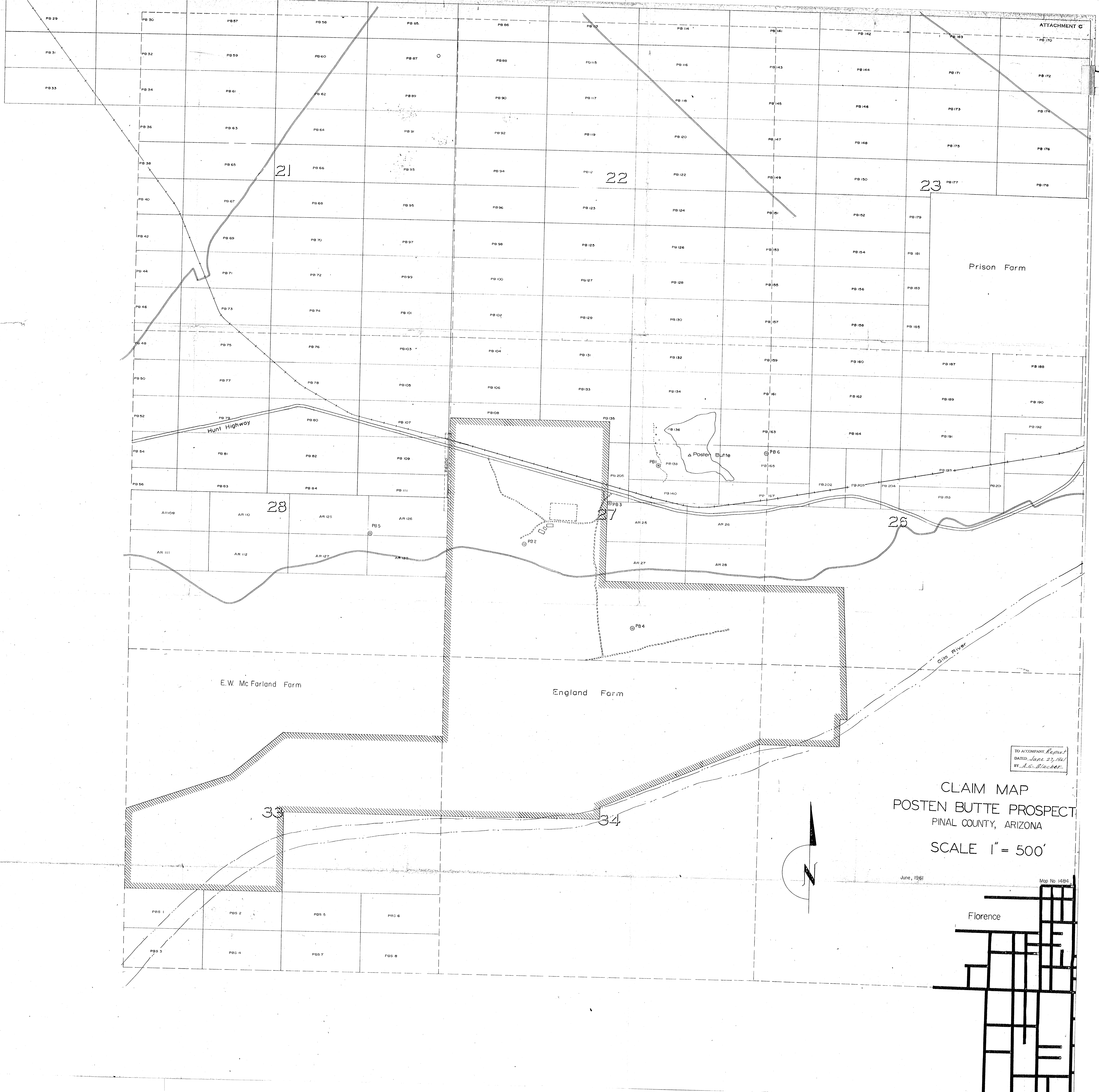
Blackwater District, Pinal County, Arizona

SCALE : 1in = 500 ft

A.G. Blucher

June, 1961
Map No. 1488

ATTACHMENT C



TO ACCOMPANY Report
DATED June 27, 1961
BY A.G. Blucher

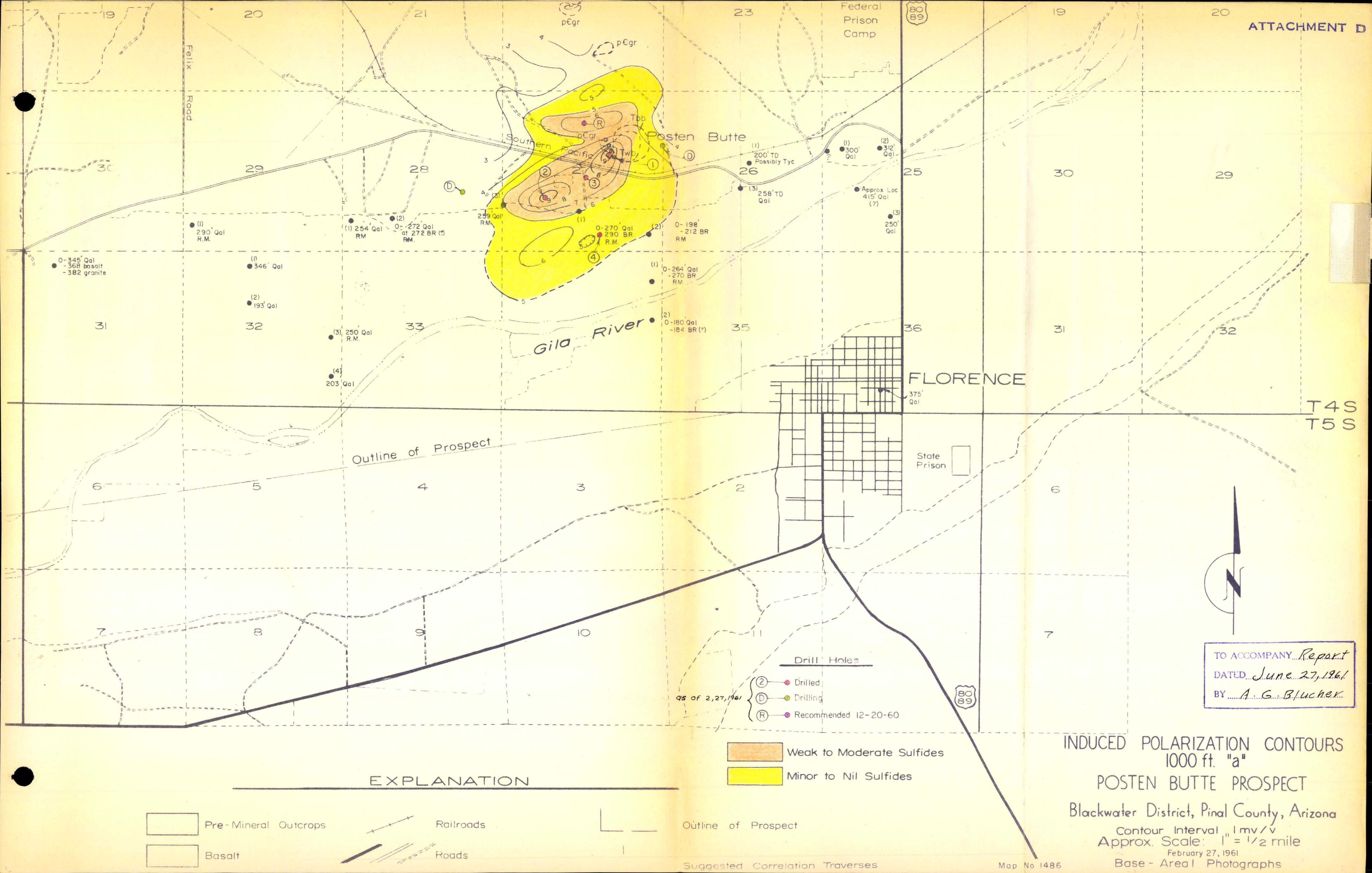
CLAIM MAP
POSTEN BUTTE PROSPECT
PINAL COUNTY, ARIZONA

SCALE 1" = 500'

June, 1961

Map No 1484

ATTACHMENT D

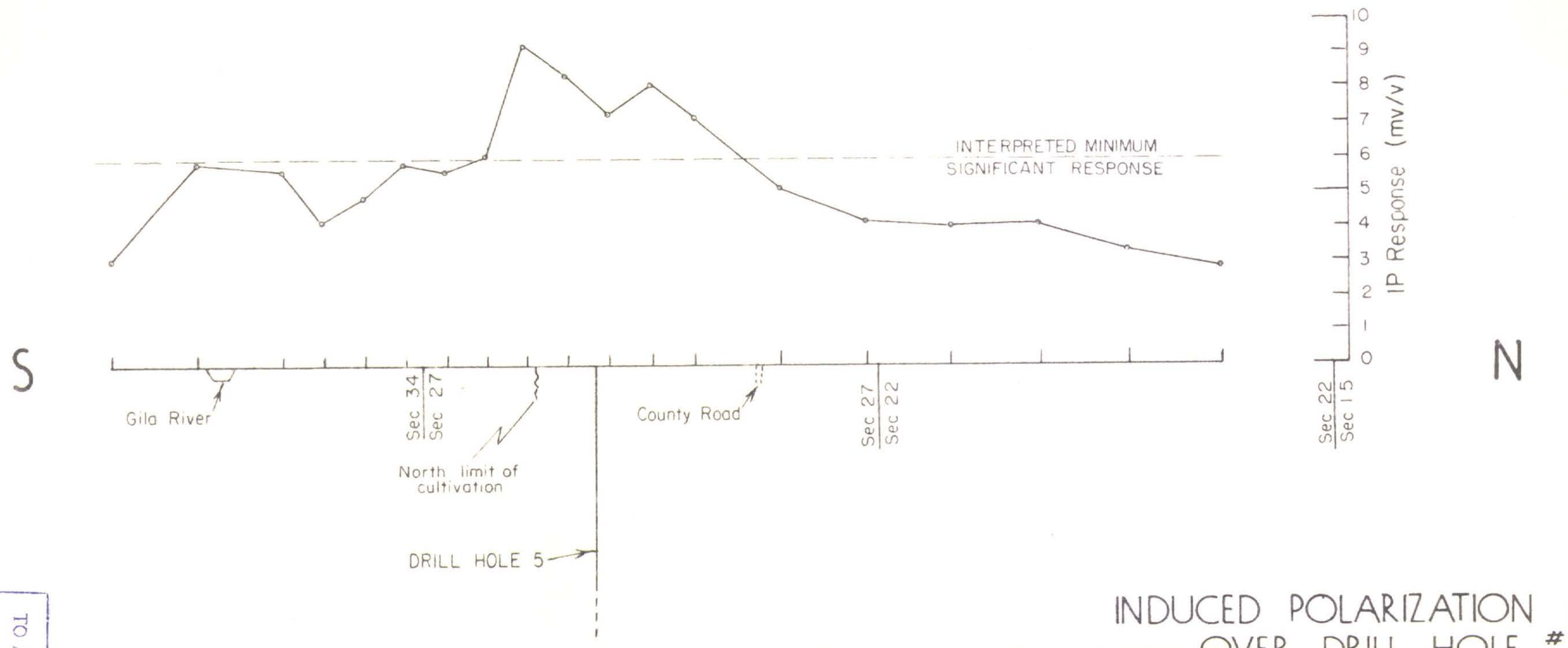


TO ACCOMPANY Report

DATED June 27, 1961

BY A. G. Blucher

INDUCED POLARIZATION CONTOURS
1000 ft. "a"
POSTEN BUTTE PROSPECT
Blackwater District, Pinal County, Arizona
Contour Interval 1 mv/v
Approx. Scale: 1" = 1/2 mile
February 27, 1961
Base - Areal Photographs



INDUCED POLARIZATION PROFILE
OVER DRILL HOLE #5

Posten Butte Prospect

Looking West

SCALE Horizontal 1 in = 2000 ft
Vertical 1 in = 5 miles

W. E. Saegart

Map No. 1487

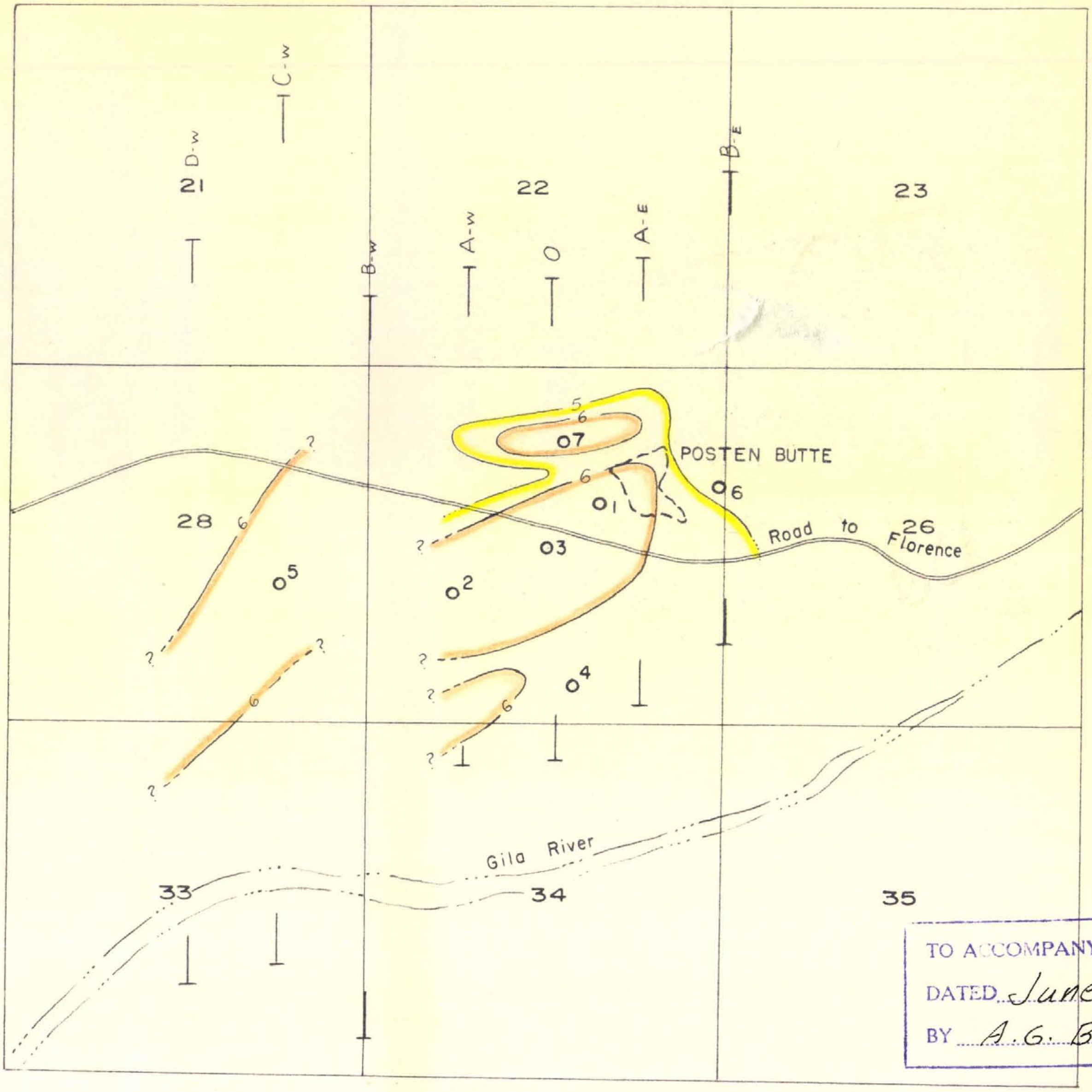
ATTACHMENT III

E

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

ATTACHMENT F

F



TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

OUTLINES OF INDUCED POLARIZATION ANOMALIES

POSTEN BUTTE PROSPECT

Pinal County, Arizona

Scale 1" = 1/2 mile

June, 1961

EXPLANATION

⊥ C-w	1000' "a" I.P. traverse	
🟨	I.P. response above 5 mv/v (shown only north of road)	Limits of Signifcant Response
🟧	I.P. response above 6 mv/v	

Map No. 1485

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Notes:
(1) Est. % Cu represented by each mineral
(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5%
Moderate (Md) 5-50%
Stong (St) +50%

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB I
Page 1 of 3 Pages
Collar Elev ______ Final Depth 410.4
Coords. N ______ E ______
Inclination ______
Logged by A. G. B.
Date: Start Finish

ATTACHMENT G

Depth				% Cu				% Core Recov.	Sp Gr	Cu (1)								Fe (2)					Other (2)											Sample Code No.	(3) Rock Type	Structures (4)	
From	To	Int'vl	Elev.	Total	Avg	N S	Avg			Chrys.	Pitch	Black	Blue Green		Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec	Galena	Sphal.	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE			Depth	True Dip
0	2.0	2.0						0																													
2.0	5.2	3.2		.04				40																										3126			
5.2	9.7	4.5		.05				81																										3127			
9.7	16.1	6.4		.05				46																										3128			
16.1	24.0	7.9		.02				72																										3129			
24.0	28.5	4.5		tr				42																										3130			
28.5	34.0	5.5		.02				62																										3131			
34.0	43.1	9.1		.02				22																										3132			
43.1	52.0	8.9		tr				88																										3133			
52.0	59.3	7.3		.02				1.1																										3134			
59.3	64.3	5.0						0																													
64.3	70.2	5.9		.02				20																										3135			
70.2	74.0	3.8						0																													
74.0	81.1	7.11		tr				100																										3136			
81.1	86.7	5.6		tr				46																										3137			
86.7	93.4	6.7		.07				73																										3138			
93.4	94.8	1.4		.06				79																										3139			
94.8	101.1	6.3		.07				38																										3140			
101.1	110.2	9.1		;04				3																										3141			
110.2	114.9	4.7		.04				90																										3179			
114.9	118.4	3.5		.06				94																										3180			
118.4	120.1	1.7	4.4	.08				88																										3181			
120.1	122.8	2.7		.04				93																										3182			
122.8	124.5	1.7	7.1	.02				70																										3183			
124.5	126.0	1.5		.05				93																										3184			
126.0	129.9	3.9		tr				82																										3185			
129.9	134.0	4.1		tr				80																										3186			
134.0	138.7	4.7		tr				46																										3187			
138.7	144.0	5.3		tr				77																										3188			
144.0	149.3	5.3		.04				51																										3189			
149.3	152.0	2.7		tr				93																										3190			
152.0	158.9	6.9		tr				66																										3191			
158,9	164.9	6.0		.04				70																										3192			
164.9	170.9	6.0		.03 ← .02 (?)				95																										3193			
170.9	177.3	6.4		tr				90																										3194			
177.3	182.8	5.5		.02				100																										3195			
182.8	190.5	7.7		tr				99																										3196			
190.5	194.0	3.5		.02				71																										3197			
194.0	200.5	6.5		.02				50																										3198			
200.5	208.5	8.0		.02				81																										3199			
208.5	214.5	6.0		.16				97																										3200			
214.5	218.2	3.7		.06				78																										3201			
218.2	221.0	2.8		.37				82																										3202			
221.0	224.0	3.0		.23				80																										3203			
224.0	226.1	3.1		.06				90																										3204			

Remarks

Soil and caliche

@ 2' Granite--oxidized and leached--weak to moderate disseminated yellowish-br or purplish br limonite--occas veinlets--moderate sericitic alteration--intensely shattered in places with fairly abundant reddish-purple or dark maroon limonite

35.0'-43.1' Intensely altered granite or porphyry (?)-- a few quartz veinlets--no quartz phenocrysts-- weak disseminated limonite--

43.1'-114.9' Granite--weak to moderate alteration--sparse limonite--core is badly broken and gougy with occasional heavy red or maroon limonite--fault gouge at 51.0' to 52.0'--

114.9'-122.8' Granite--moderate to intense alteration---moderate disseminated chalcocite---limonite--

122.8'-185!0' Granite---weak to moderate alteration---occasional fair chalcocite--limonite--plagioclase is moderately altered and chalky---orthoclase is very slightly altered---biotite is slightly altered or fresh---

185.0'-213.0' Granite---moderate to intense alteration---some silicification---abundant chalcocite--limonite---

213.0'-216.0' Same as 185.0'-213.0' but only partly oxidized---some chalcocite replacing pyrite---

216.0'-222.0' Same as 122.8'-185.0' --- some chalcocite partly replacing pyrite---

222.0'-229.2' Same as 185.0'-213.0' --- no sulfides---

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5 %
Moderate (Md) 5-50 %
Stong (St) + 50 %

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Note (3)
Tt - Toctite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 1
Page 2 of 3 Pages
Collar Elev
Final Depth 410.4
Coords. N
E
Inclination
Logged by A.G.B.
Date: Start
Finish

Depth			Elev.	% Cu				% Core Recov.	Sp. Gr.	Cu (1)							Fe (2)					Other (2)											(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N S	Avg			Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec.	Galena	Sphal.	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn. Qtz	QUARTZ	CHLORITE		Depth	True Dip
226.1	229.2	3.1		.28				68																											
229.2	232.4	3.2		.17				84																											
232.4	233.6	1.2		.14				83																											
233.6	237.5	3.9		.21				67																											
238.5	241.5	4.0		.34				97																											
241.5	243.3	1.8		.12				90																											
243.3	246.4	3.1		.12				90																											
246.4	250.7	4.3		.14				63																											
250.7	252.8	2.1		.16				90																											
252.8	256.8	4.0		.12				55																											
256.8	260.1	3.3		.18				49																											
260.1	264.2	4.1		.19				70																											
264.2	266.0	1.8		.18				50																											
266.0	268.4	2.4		.49				79																											
268.4	271.2	2.8		1.51				57																											
271.2	275.7	4.5		.21				52																											
275.7	279.8	4.1						0																											
279.8	281.4	1.5		.18				96																											
281.4	284.3	2.9		.82				56																											
284.3	286.0	1.7		2.19				84																											
286.0	289.5	3.5		.61				74																											
289.5	293.5	4.0		.25				85																											
293.5	298.0	4.5		.27				45																											
298.0	298.8	0.8		.24				37																											
298.8	300.5	1.7		.03				41																											
300.5	301.9	1.4		.11				93																											
301.9	302.6	0.7		.18				72																											
302.6	306.1	3.5		.11				97																											
306.1	310.7	4.6		.02				79																											
310.7	314.9	4.2		.06				90																											
314.9	316.7	1.8		.11				77																											
316.7	318.6	1.9		.08				100																											
318.6	325.2	6.6		.05				52																											
325.2	328.3	3.1		.02				87																											
328.3	330.7	2.4		.11				100																											
330.7	333.6	2.9		.07				76																											
333.6	335.1	1.5		.07				87																											
335.1	339.0	3.9		.10				54																											
339.0	340.6	1.6		.03				87																											
340.6	343.3	2.7		.06				100																											
343.3	346.6	3.3		.03				94																											
346.6	348.7	2.1		.03				90																											
348.7	351.5	2.8		.04				89																											
351.5	355.7	4.2		.05				29																											

Remarks

229.2'-238.0' Granite---weak to moderate alteration---plagioclase feldspar sericitized---biotite partly altered or occasionally fresh---large pink orthoclase phenocrysts nearly fresh---moderate pyrite partly replaced by chalcocite on fractures, as discrete grains, and in steeply dipping quartz veinlets---some pyrite intergrown with mafic minerals--occasional limonite---gouge @ 237.5'-238'---

238.0'-250.7' Same as 229.2'-238.0' except slight increase in alteration---

250.7'-267.0' Same as 229.2'-238.0'---

267.0'-272.0' Gray gouge with abundant chalcocite---gouge and veinlets dip 50°-65° ---after 271.2' gouge and chalcocite is completely oxidized---

272.0'-298.8' Same as 229.2'-238.0'---275.7' to 279.8' no core---@ 281' 2 inches gouge---@ 282' increase in chalcocite--

298.8'-322.0' Diabase --- veinlet and disseminated pyrite---very little chalcocite or chalcopyrite---

322.0'-331.0' Granite --- intense sericitization and silicification---abundant pyrite---very weak chalcopyrite---

331.0'-340.0' Same except for diminishing pyrite and occasional limonite on fractures---

340.0'-364.0' Same except increasing yellowish limonite---core is badly broken and gougy---

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %, or, as follows:
Trace (Tr); Sparce (Sp) < 5 %
Moderate (Md) 5 - 50 %
Stong (St) + 50 %

Note (3)
Tr - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 3
Page 1 of 1 Pages
Collar Elev ______ Final Depth 343.0
Coords. N ______ E ______
Inclination ______
Logged by A. G. B.
Date: Start ______ Finish ______

ATTACHMENT I

Depth			Elev.	% Cu				% Core Recov.	Sp. Gr.	Cu (1)								Fe (2)					Other (2)											(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N S	Avg			Chrys.	Pitch	Black	Blue Green		Cc.	Cpy.	Born	Lim.	Py	Mag	Hem.	Spec.	Galena	Sphal.	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn. Qtz	QUARTZ	CHLORITE		Depth	True Dip
0	227																																			
227	240																																			
240	240.9	0.9						0																												
240.9	244.0	3.1		.04				10																												
244.0	250.2	6.2		.04				16																												
250.2	255.0	4.8		.03				10																												
255.0	259.0	4.0		.03				61																												
259.0	265.0	6.0		.14				32																												
265.0	271.7	6.7		.06				62																												
271.7	282.0	10.3						0																												
282.0	285.0	3.0		.22				50																												
285.0	290.2	5.2		.05				81																												
290.2	293.3	3.0		.07				83																												
293.3	296.0	2.7		.05				100																												
296.0	298.8	2.8		.05				100																												
298.8	301.9	3.1		.05				73																												
301.9	303.7	1.8		.07				100																												
303.7	306.3	2.6		.04				86																												
306.3	313.8	7.5		.03				16																												
313.8	317.4	3.6		.10				72																												
317.4	318.7	1.3		.06				100																												
318.7	323.3	4.6		.08				93																												
323.3	325.0	1.7		.08				100																												
325.0	328.8	3.8		.10				70																												
328.8	331.0	2.2		.06				98																												
331.0	335.0	4.0		.09				100																												
335.0	336.9	1.9		.07				86																												
336.9	338.8	1.9		.14				100																												
338.8	343.0	4.2		.08				56																												

Remarks

0'-227' Gila River gravels

227'-240' Monzonite Porphyry cored with a rockbit---

240.0'-259.0' Monzonite Porphyry --- Oxidized and leached---yellowish, brownish or black limonite on thin fractures---246'-250' and 252-255' core is very badly broken and gougy---

259.0'-271.0' Yellowish white, brown, or purple gouge and monzonite fragments ---

271.0'-282.0' No core.

282.0'-287.0' Monzonite Porphyry --- moderately altered---feldspars sericitized or kaolinized ---book biotite fresh or weakly altered --- very weak disseminated pyrite -- no chalcocite or chalcopyrite ---

287.0'-294.0' Same but alteration and mineralization increases --- biotite is chloritized ---

294.0'-299.0' Same as 282'-287' --- @ 298' gouge

299.0'-302.0' Same as 287'-289' ---

302.0'-331.0' Same as 282'-287' --- @ 315' gouge with weak chalcopyrite ---

331.0'-343.0' Same except feldspars increase in size and sulfides increase ---

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

I

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5 %
Moderate (Md) 5-50 %
Stong (St) +50 %

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 4
Page 1 of 1 Pages
Collar Elev ______ Final Depth 361.0
Coords. N ______ E ______
Inclination ______
Logged by A.G.B.
Date: Start ______ Finish ______

Depth			Elev.	% Cu				% Core Recov.	Sp. Gr.	Cu (1)							Fe (2)					Other (2)											(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N S	Avg			Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Lim.	Py	Mag.	Hem.	Spec.	Galena	Sphal.	Molyb	Calcite	Garnet.	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE		Depth	True Dip
0	267																																		
267	282.0																																		
282.0	283.8	1.8						0																											
283.8	285.0	1.2		.05				100																											
285.0	287.5	2.5		.05				88																											
287.5	290.8	3.3		.04				61																											
290.8	295.0	4.2		.04				11																											
295.0	300.7	5.7		.03				29																											
300.7	305.0	4.3		.04				43																											
305.0	309.3	4.3		.04				74																											
309.3	313.9	4.6		.04				89																											
313.9	317.3	3.4		.05				85																											
317.3	321.8	4.5		.03				50																											
321.8	325.0	3.2		.04				63																											
325.0	330.8	5.8		.08				68																											
330.8	337.2	6.4		.04				36																											
337.2	341.4	4.2		.06				76																											
341.4	344.7	3.3		.10				92																											
344.7	349.9	3.2		.04				64																											
349.9	350.5	2.6		.03				100																											
350.5	352.5	2.0		.03				95																											
352.5	358.6	6.1		.02				70																											
358.6	361.0	2.4		.06				50																											

Remarks **ATTACHMENT J**

0'-267' Gila River gravels

267'-282.0' Monzonite Porphyry drilled with rockbit---

282.0'-283.8' No core ---

283.8'-295.0' Monzonite Porphyry --- weak to moderate alteration --- leached and oxidized --- moderate limonite after pyrite ---

295.0'-319.0' Granite --- weak alteration and mineralization

319.0'-326.0' Monzonite Porphyry --- weak to moderate alteration and mineralization ---

326.0'-349.0' Granite --- intense chloritic, and sericitic alteration --- after 341.4' no oxides --- core is sheared and gougy --- moderate pyrite and weak chalcopyrite---

349.0'-360.5' Monzonite Porphyry --- weak disseminated pyrite --- no chalcocite or chalcopyrite --- vertical gypsum veinlets are common ---

J

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5 %
Moderate (Md) 5 - 50 %
Stong (St) + 50 %

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 5
Page 2 of 2 Pages
Collar Elev
Final Depth 573.0
Coords. N
E
Inclination
Logged by A. G. B.
Date: Start
Finish

Depth			Elev.	% Cu				% Core Recov.	Sp. Gr.	Cu (1)								Fe (2)					Other (2)												(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N S	Avg			Chrys.	Pitch	Black	Blue Green		Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec	Galena	Sphal	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE			Depth	True Dip
507.2	511.2	4.0		.28				100																													
511.2	515.0	3.8		.13				100																													
515.0	519.0	4.0		.07				100																													
519.0	521.3	2.3		.22				100																													
521.3	524.5	3.2		.17				100																													
524.5	527.5	3.0		.30				100																													
527.5	529.5	2.0		.37				100																													
529.5	532.5	3.0		.19				66																													
532.5	535.2	2.7		.26				89																													
535.2	537.6	2.4		.61				69																													
537.6	545.0	7.4		.09				100																													
545.0	548.7	3.7		.17				80																													
548.7	553.2	4.5		.70				100																													
553.2	560.2	7.0		.24				100																													
560.2	562.0	1.8		.20				100																													
562.0	566.5	4.5		.49				100																													
566.5	569.5	3.0		.13				100																													
569.5	573.0	3.5		.16				95																													

Remarks

502.0'-531.0' Granite --- moderately altered --- biotite altered or absent --- occasional chalcocite replacing pyrite or chalcopyrite --- after 512.0' less alteration and mineralization --- @ 524' veinlet of molybdenite and after 526' increasing chalcopyrite ---

531.0'-573.0' Diabase --- fine-grained and partly altered--- weak to moderate chalcopyrite--- moderate pyrite -- occasional magnetite and epidote with pyrite in veinlets ---

K

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5%
Moderate (Md) 5-50%
Stong (St) +50%

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO- POSTEN BUTTE PROSPECT

Note (3)
Tt - Tactite
Hf - Hornfels
Mb- Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB I
Page 3 of 3 Pages
Collor Elev ______ Final Depth 410.4
Coords. N ______ E ______
Inclination ______
Logged by A. G. B.
Date: Start Finish

Depth				% Cu						Cu (1)								Fe (2)					Other (2)												(3)	Structures (4)	
From	To	Int'vl	Elev.	Total	Avg.	N.S	Avg	% Core Recov	Sp. Gr.	Chrys.	Pitch	Black	Blue Green		Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec.	Galena	Sphal	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn. Qtz	QUARTZ	CHLORITE		Rock Type	Depth	True Dip
355.7	357.4	1.7		.02				59																													
357.4	360.5	3.1		.08				51																													
360.5	364.0	3.5		.28				57																													
364.0	368.1	4.1		.21				85																													
368.1	372.6	4.5		.18				75																													
372.6	378.0	5.4		.27				85																													
378.0	378.5	0.5		.64				100																													
378.5	384.9	6.4		.20				47																													
384.9	388.0	3.1		.17				39																													
388.0	390.1	2.1		.12				90																													
390.1	394.0	3.9		.02				54																													
394.0	399.7	5.7		tr				95																													
399.7	400.4	0.7		tr				14																													
400.4	404.4	4.0		tr				80																													
404.4	408.2	5.8		.02				26																													
408.2	410.4	2.2		.02				40																													

Remarks

364.0'-366.0' Same as 331.0'-340.0' except increase in chalcocite after 364.0'---

366.0'-378.0' Same as 340'-364' except weak to moderate chalcocite --- @ about 377' several veinlets of chalcocite replacing pyrite --- partly oxidized in places---

378.0'-394.0' Core is badly broken and gougy---disseminated and veinlet pyrite and chalcocite are partly oxidized and leached--- @ 388.0' to 390.0' gray gouge---occasional chloritic alteration --- @ 393.0' to 394.0' gouge --- after 394.0' chlorite increases ---

394.0'-407.0' Granite --- intensely altered --- biotite absent or chloritized --- abundant quartz --- plus 5% pyrite with very little chalcocite or chalcopyrite --- after 399' sharp increase in chlorite and pyrite --- 403' to 407' mostly gouge and breccia---

407.0'-410.4' Monzonite Porphyry --- intensely altered --- abundant chlorite --- only indistinct remnants of feldspars-- several per cent pyrite with no identifiable copper sulfides--

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Notes:

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Trace (Tr); Sparce (Sp) < 5%
Moderate (Md) 5-50%
Stong (St) +50%

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 5
Page 1 of 2 Pages
Collar Elev ______ Final Depth 573.0
Coords. N ______ E ______
Inclination ______
Logged by A.G.B.
Date: Start ______ Finish ______

ATTACHMENT K

Depth From	Depth To	Int'vl	Elev.	% Cu Total	% Cu Avg.	% Cu N S	% Cu Avg	% Core Recov.	Sp. Gr.	Cu (1) Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Fe (2) Lim.	Py	Mag.	Hem	Spec.	Other (2) Galena	Sphal.	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE	(3) Rock Type	Structures (4) Depth	True Dip
0	272																																		
272	341																																		
341	350																																		
350.0	351.4	1.4		0.14				100																											
351.4	354.7	3.3		.21				74																											
354.7	357.1	2.4		.25				89																											
357.1	362.0	4.9		.62				69																											
362.0	365.0	3.0		.21				82																											
365.0	366.5	1.5		.26				62																											
366.5	369.5	3.0		.33				73																											
369.5	372.5	3.0		.52				100																											
372.5	375.0	2.5		.45				80																											
375.0	377.6	2.6		.27				100																											
377.6	382.4	4.8		.25				90																											
382.4	386.4	4.0		.22				90																											
386.4	389.5	3.1		.23				100																											
389.5	392.7	3.2		.29				68																											
392.7	396.0	3.3		.31				86																											
396.0	399.3	3.3		.12				100																											
399.3	403.6	4.3		.12				100																											
403.6	408.4	4.8		.15				88																											
408.4	412.6	4.2		.20				100																											
412.6	414.0	1.4		.22				100																											
414.0	423.6	9.6		.11				64																											
423.6	427.3	3.7		.18				100																											
427.3	432.9	5.6		.16				86																											
432.9	439.2	6.3		.44				63																											
439.2	441.5	2.3		.18				98																											
441.5	445.7	4.2		.25				100																											
445.7	452.0	7.3		.11				89																											
452.0	458.0	6.0		.15				86																											
458.0	461.2	3.2		.25				100																											
461.2	464.7	3.5		.20				91																											
464.7	467.0	2.3		.22				100																											
467.0	475.0	8.0		.21				77																											
475.0	478.1	3.1		.20				100																											
478.1	483.0	4.9		.92	17.405/23.7 = .73			89																											
483.0	487.0	4.0		.84				75																											
487.0	489.5	2.5		.42				98																											
489.5	492.6	3.1		1.20				97																											
492.6	496.2	3.6		.66				83																											
496.2	499.5	3.3		.39				61																											
499.5	501.8	2.3		.48				92																											
501.8	507.2	5.4		.32				100																											

Remarks

0'-272' Gila River gravels

272'-341' Conglomerate

341'-350' Monzonite Porphyry drilled with rockbit---

350'-365.0' Monzonite Porphyry --- weak to moderate alteration --- feldspars chalky and indistinct --- biotite slightly altered or fresh --- occasional quartz veinlets --- occasional limonite after chalcocite --- occasional copper stain on fractures --- occasional chrysocolla---

365.0'-373.0' Same, except no copper stain and there is occasional relict chalcocite ---

373.0'-379.0' Same, except decrease in mineralization ---

379.0'-382.0' Same as 365'-373'

382.0'-395.0' Same as 373'-375'

395.0'-399.0' Granite --- intensely altered --- limonite on fractures --- occasional chalcocite---

399.0'-400.0' Monzonite Porphyry (?)

400.0'-478.0' Granite --- short segments of intense silicification separated by segments of weak to moderate alteration --- occasional limonite after chalcocite --- occasional relict chalcocite --- @ 414' good veinlets limonite after chalcocite in silicified granite --- @ 452' and 465'-468' gouge and breccia ---

478.0'-500.0' Same but diminishing oxides and increasing sulfides --- after 481.0' good vugs and veinlets of chalcocite---

500.0'-500.2' Monzonite Porphyry --- weakly altered and mineralized --- @ 502.0' 6" gouge ---

TO ACCOMPANY Report
DATED June 27, 1961
BY A. G. Blucher

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Notes:
(1) Est. % Cu represented by each mineral
(2) Est. mineral %, or, as follows:
Trace (Tr); Sparce (Sp) < 5%
Moderate (Md) 5-50%
Stong (St) +50%

Note (3)
Tt - Tactite
Hf - Hornfels
Mb- Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 2
Page 1 of 1 Pages
Collar Elev ______ Final Depth 465.0
Coords N ______ E ______
Inclination ______
Logged by A. G. B.
Date: Start ______ Finish ______

ATTACHMENT H

Depth				% Cu						Cu (1)							Fe (2)					Other (2)												Structures (4)	
From	To	Int'vl	Elev.	Total	Avg.	N S	Avg	% Core Recov	Sp Gr.	Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Lim.	Py	Mag	Hem.	Spec.	Galena	Sphal.	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn. Qtz	QUARTZ	CHLORITE	(3) Rock Type	Depth	True Dip
0	327																																		
327	355																																		
355	374																																		
374.0	377.6	3.6		tr				83																											
377.6	381.0	3.4		.02				15																											
381.0	382.5	1.5		.03				14																											
382.5	385.3	2.8		.02				25																											
385.3	388.9	3.6		.02				33																											
388.9	395.0	6.1		.04				40																											
395.0	397.4	2.4		.18				38																											
397.4	400.6	3.2		.03				67																											
400.6	401.6	1.0		.06				78																											
401.6	402.3	0.7		.04				61																											
402.3	404.2	1.9		.06				85																											
404.2	407.0	2.8		.02				21																											
407.0	408.2	1.2		tr				66																											
408.2	412.3	4.1		tr				70																											
412.3	415.3	3.0		.02				85																											
415.3	417.5	2.2		.02				100																											
417.5	420.5	3.0		tr				93																											
420.5	423.9	3.4		.03				80																											
423.9	427.0	3.1		.08				100																											
427.0	429.0	2.0		.06				100																											
429.0	430.8	1.8		.04				89																											
430.8	432.5	1.7		.11				90																											
432.5	433.2	0.7		.08				37																											
433.2	436.9	3.7		.04				68																											
436.9	439.2	2.3		.03				100																											
439.2	441.4	1.9		.05				100																											
441.1	443.8	2.7		.02				76																											
443.8	444.3	1.5		.02				33																											
444.3	446.1	1.8		.03				100																											
446.1	446.5	0.4		.02				75																											
446.5	447.6	1.0		.08				90																											
447.6	448.2	0.6		.02				83																											
448.2	451.3	3.1		tr				89																											
451.3	452.0	0.7		tr				82																											
452.0	452.5	0.5		tr				60																											
452.5	454.2	1.7		.04				41																											
454.2	458.0	4.8		.05				73																											
458.0	460.8	2.8		.05				93																											
460.8	465.0	4.2		.04				76																											

Remarks

0'-327' Gila River gravels

327'-355' Conglomerate

355'-370.0' Altered monzonite porphyry bedrock dilled with 4-3/4" rock bit.

370.0'-378.0' Monzonite Porphyry --- moderate to intense sericitic alteration --- common to abundant veinlets of limonite after chalcocite and limonite after pyrite---

378.0'-385.0' Same but decrease in alteration and mineralization --- most limonite is after pyrite ---

385.0'-389.0' Same but with occasional relict pyrite --- some biotite is in fresh books ---

389.0'-395.0' Moderate to intense sericitic alteration w occasional chalcocite replacing pyrite --- no oxides -- 391.0'-395.0' gray gouge and breccia ---

395.0'-409.5' Monzonite Porphyry --- weak to moderate a ation---feldspars partly sericitized --- biotite absent, partly altered, or fresh --- weak chalcocite replacing pyrite ---moderate to abundant quartz phenocrysts ---occasional quartz veinlets---alteration and chalcocite decrease gradually after 397.0' --- @ 409' gouge ---

409.5'-413.0' Andesite Porphyry --- white lathe shaped feldspars in a sheared gray-green ground mass---no apparent mineralization --- @ 412' gouge---

413.0'-458.0' Monzonite Porphyry --- alteration varies from weak to moderate in alternating zones of 15' to 20' thickness --- pyrite disseminated and on fractures --- no chalcocite--- very weak chalcopyrite---after 436' occasional veinlets of gypsum---

458.0'-465.0' Same with slight increase in quartz-pyrite veinlets with occasional very weak chalcopyrite and molybdenite--- After 461' alteration increases ---

TO ACCOMPANY Report
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Moderate (Md) 5 - 50 %
Stong (St) + 50 %

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO - POSTEN BUTTE PROSPECT

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 6
Page 1 of 1 Pages
Collar Elev
Final Depth 809.0
Coords. N
E
Inclination
Logged by A.G.B.
Date: Start
Finish

Depth			Elev.	% Cu				% Core Recov	Sp Gr	Cu (1)							Fe (2)					Other (2)											(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N.S	Avg			Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec.	Galena	Sphal	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE		Depth	True Dip
0	100																																		
100	680																																		
680.0	682.9	2.9		.02				98																											
682.9	689.5	6.6		tr				100																											
689.5	695.0	5.5		tr				100																											
695.0	700.8	5.8		.02				100																											
700.8	707.6	6.8		.02				100																											
707.6	713.6	6.0		tr				100																											
713.6	718.6	5.0		tr				100																											
718.6	722.6	4.0		tr				100																											
722.6	729.0	6.4		.02				100																											
729.0	739.0	10.0		tr				100																											
739.0	749.0	10.0		tr				80																											
749.0	752.0	3.0		.02				51																											
752.0	755.7	3.7		.02				100																											
755.7	761.7	6.0		tr				100																											
761.7	766.0	5.3		tr				90																											
766.0	772.0	6.0		tr				100																											
772.0	779.0	5.0		.06				100																											
779.0	787.8	8.8		.02				100																											
787.8	795.0	2.2		.02				90																											
795.0	801.5	6.5		tr				100																											
801.5	809.0	7.5		tr				100																											

Remarks

ATTACHMENT L

0'-100' Gila River gravels

100'-680' Conglomerate

680'-708.0' Granite --- weak to moderate alterations --- feldspars partly sericitized or kaolinized --- quartz phenocrysts occasionally shattered --- biotite partly altered or fresh --- 680' to 685' abundant red limonite on fractures--- some red "fog" in feldspars --- @ 695' to 696' gouge and breccia ---

708.0'-740.0' Same except increasing thick veinlets--- limonite and hematite with thin quartz --- sericite boundaries.

740.0'-747.0' Granite --- intensely altered --- heavy pyrite on steeply dipping vugs and thick veinlets --- no chalcocite

747.0'-772.0' Mostly gouge and breccia with occasional heavy pyrite ---

772.0'-779.0' Granite --- moderately altered --- most feldspars greenish or pink --- some biotite fresh --- weak pyrite except for occasional thick veinlets --- very weak chalcopyrite --- no chalcocite ---

779.0'-809.0' Monzonite Porphyry --- intensely altered --- gray or dark greenish groundmass --- feldspars chalky or greenish --- mafics altered to chlorite --- moderate disseminated and veinlet pyrite --- occasional zones of more intense alteration in shattered and gougy rock --- after 800' pyrite dimishes ----

TO ACCOMPANY Report
DATED June 27, 1961
BY A.G. Blucher

Notes:

(1) Est. % Cu represented by each mineral

(2) Est. mineral %; or, as follows:
Trace (Tr); Sparce (Sp) < 5 %
Moderate (Md) 5-50 %
Stong (St) +50 %

PRELIMINARY GEOLOGIC LOG

(Subject to Revised Logging)

ASARCO-POSTEN BUTTE PROSPECT

Note (3)
Tt - Tactite
Hf - Hornfels
Mb - Marble
Qt - Quartzite
Bx - Breccia
Da - Dacite
Mz - Monzonite
An - Andesite

Note (4)
V - Vein
F - Fault
D - Dike
C - Contact
Ig - Undif igneous

Hole No. PB 7
Page 1 of 1 Pages
Collar Elev
Final Depth 307.0
Coords. N
E
Inclination
Logged by A. G. B.
Date Start
Finish

ATTACHMENT M

Depth			Elev.	% Cu				% Core Recov.	Sp Gr	Cu (1)							Fe (2)					Other (2)											(3) Rock Type	Structures (4)	
From	To	Int'vl		Total	Avg.	N S	Avg			Chrys.	Pitch	Black	Blue Green	Cc.	Cpy.	Born	Lim.	Py	Mag	Hem	Spec.	Galena	Sphal	Molyb	Calcite	Garnet	Silicates	Sericite	Clay	Vn Qtz	QUARTZ	CHLORITE		Depth	True Dip
0	160																																		
160.0	168.0	8.0		.04				25																											
160	182																																		
182.0	185.0	3.0		.02				83																											
185.0	189.0	4.0		tr				100																											
189.0	195.5	6.5		.02				100																											
195.5	205.1	9.6		tr				92																											
205.1	209.0	3.9		.06				100																											
209.0	215.3	6.3		.05				96																											
215.3	225.0	9.7		.04				76																											
225.0	233.0	8.0		.02				37																											
233.0	241.2	8.2		.03				34																											
241.2	243.9	2.7		.06				52																											
243.9	247.8	3.9		.09				18																											
247.8	252.5	4.7		.08				16																											
252.5	254.0	1.5		.03				100																											
254.0	257.4	3.4		.04				100																											
257.5	262.9	5.5		.10				100																											
262.9	269.2	6.3		.05				78																											
269.2	273.0	3.8		.05				69																											
273.0	278.0	5.0		.08				51																											
278.0	279.8	1.8		.12				100																											
279.8	287.0	7.2		.05				70																											
287.0	296.5	9.5		.02				28																											
296.5	300.5	4.0		.03				100																											
300.5	307.0	6.5		.06				98																											

Remarks

0'-160' Gila River gravels

160.0'-168.0' Granite --- intensely altered --- moderate limonite after chalcocite on vertical quartz -- gypsum veinlets ---

160'-182.0' Rockbit

182.0'-186.0' Granite --- intensely altered --- thick, steeply dipping veinlets of brick red limonite with occasional limonite after chalcocite --- after 184' alteration decreases ---

186.0'-233.0' Granite --- moderate alteration --- feldspars soft and stained orange with limonite fog --- quartz phenocrysts shattered --- occasionally large feldspar phenocrysts show fresh cleavage faces --- weak to moderate chalcocite --- limonite on veinlets ---

233.0'-255.0' Same, except alteration increases --- after 244.0' occasional pyrite and very weak chalcocite ---

255.0'-263.0' Granite --- intensely altered --- thick veinlets of pyrite partly replaced by chalcocite --- partly oxidized after 260' ---

263.0'-273.0' Granite --- weak to moderate alteration --- moderate pyrite --- weak chalcocite ---

273.0'-296.0' Same, except increase in alteration --- gouge and breccia @ 278', 281', 287', and 293-296' --- after 280' no chalcocite --- occasionally partly oxidized ---

296.0'-307.0' Granite --- moderately altered --- veinlet and disseminated pyrite with no chalcopyrite or chalcocite--- @ 307' gouge ---

TO ACCOMPANY Report
DATED June 27, 1961
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M

ATTACHMENT N

COMPOSITE SAMPLES

D.H. No.	Composite	Sample No. (Incl.)	Cu	Non-Sulfide	Au	Ag	Mo	% Total Sulfide
PB 1	A	3205 - 3218						3½%
PB 1	B	3238 - 3247 3311 - 3313						4 %
PB 1	C	3205 - 3247 3311 - 3326						5 %
PB 2	D	3350 - 3369	0.03		.005	0.2	Tr.	2½%
PB 3	E	3370 - 3379		0.03				2 %
PB 3	F	3380 - 3394	0.06		Tr.	0.2	.002	3 %
PB 5	G	3421 - 3448		0.07				
PB 5	H	3456 - 3474			Tr.	0.1	0.002	5 %
PB 6	I	3485 - 3495			Tr.	0.2	Tr.	7 %
PB 7	J	3510 - 3519			Tr.	0.2	Tr.	5 %

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