



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

The following file is part of the John E. Kinnison mining collection

ACCESS STATEMENT

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

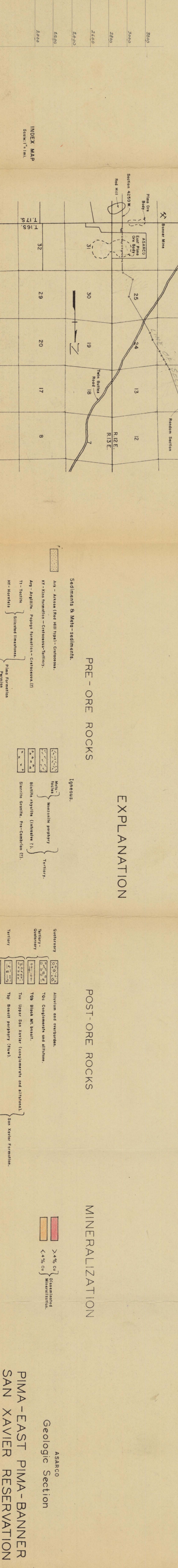
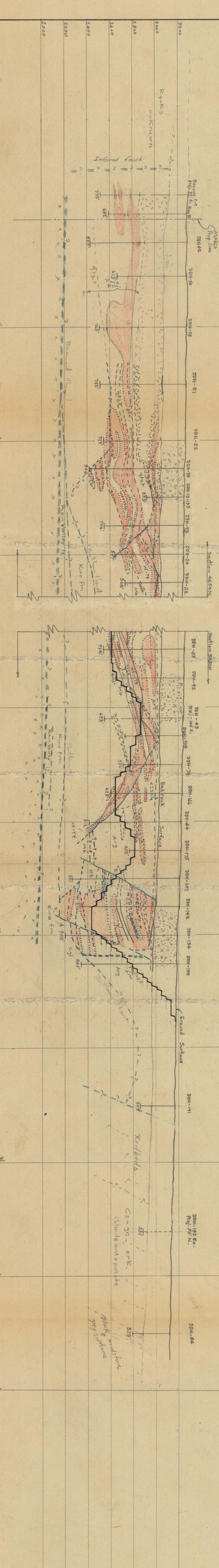
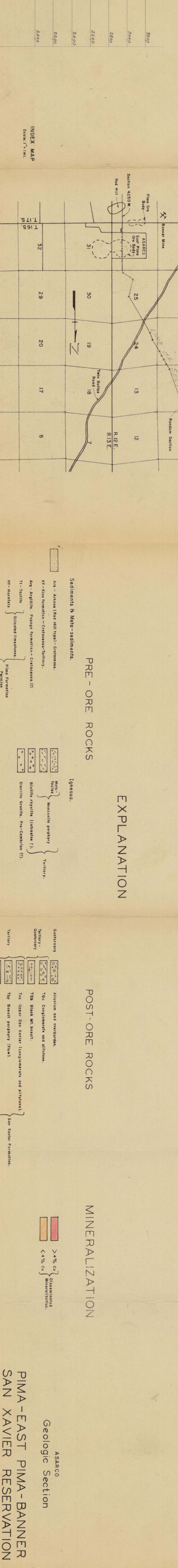
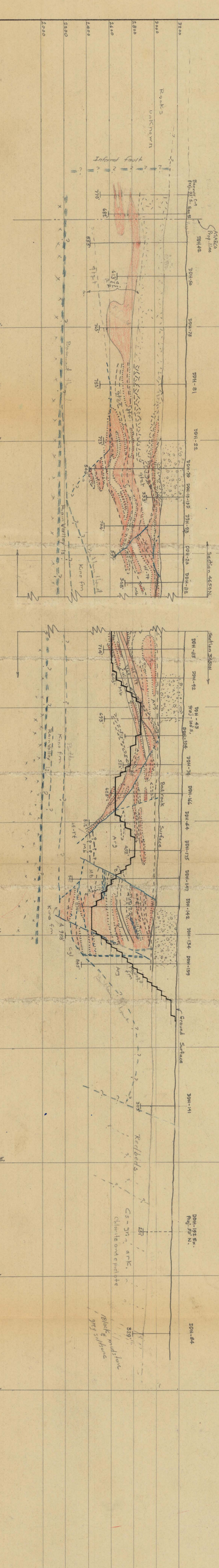
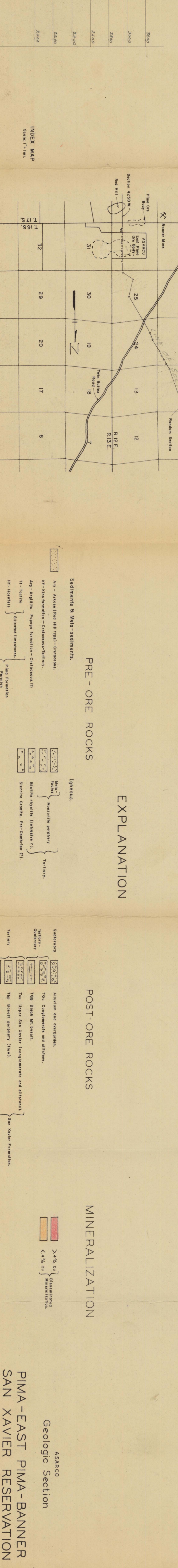
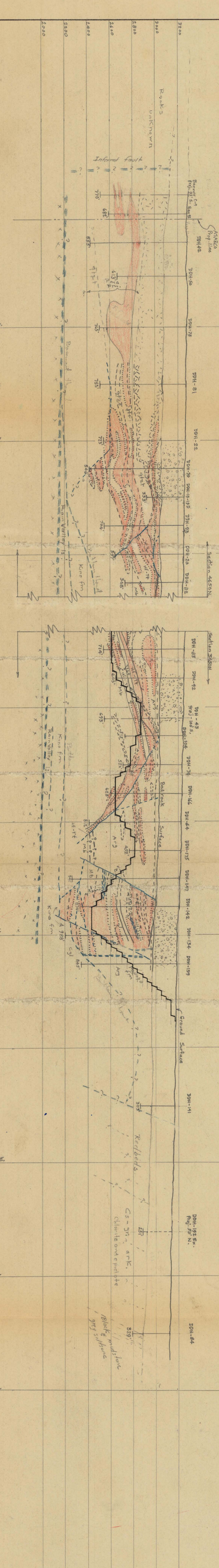
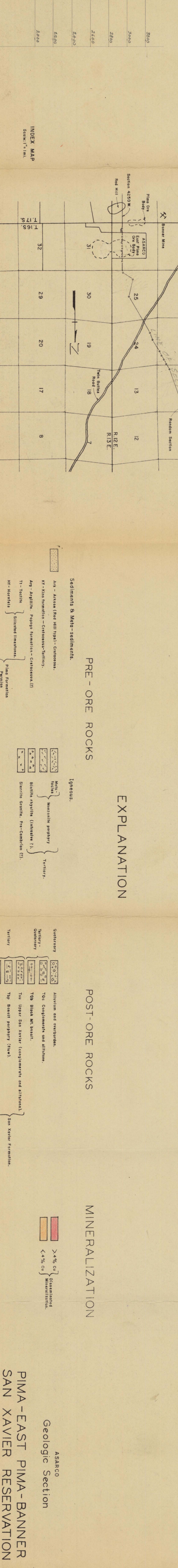
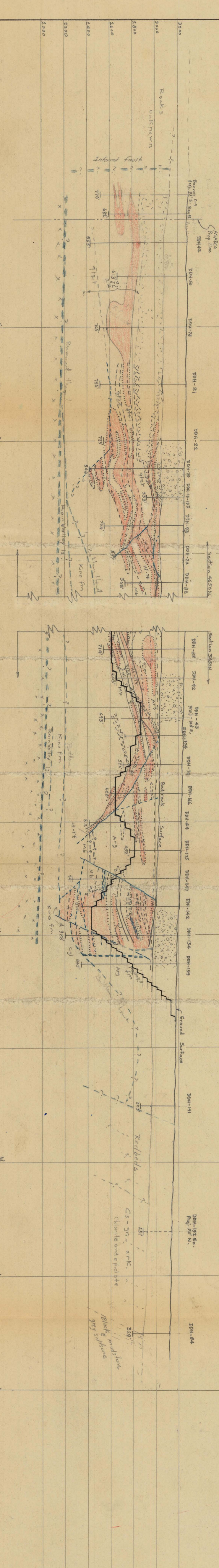
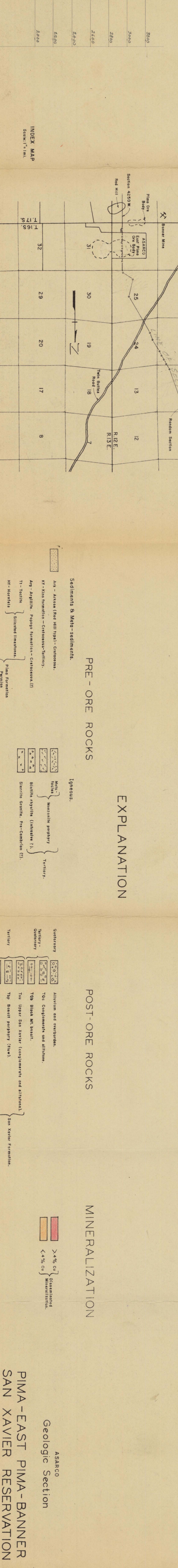
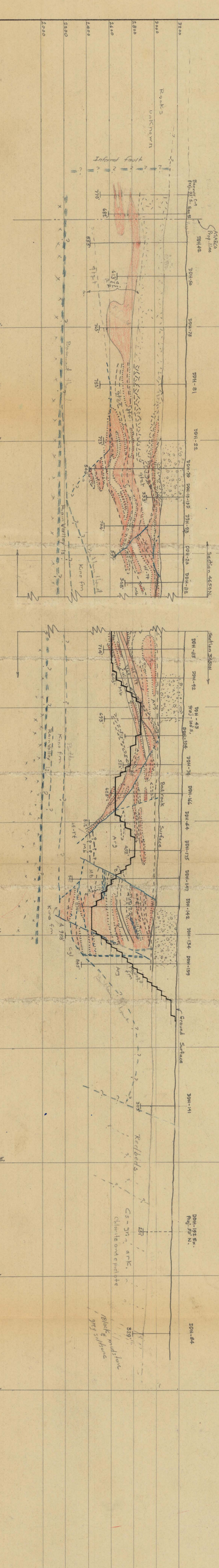
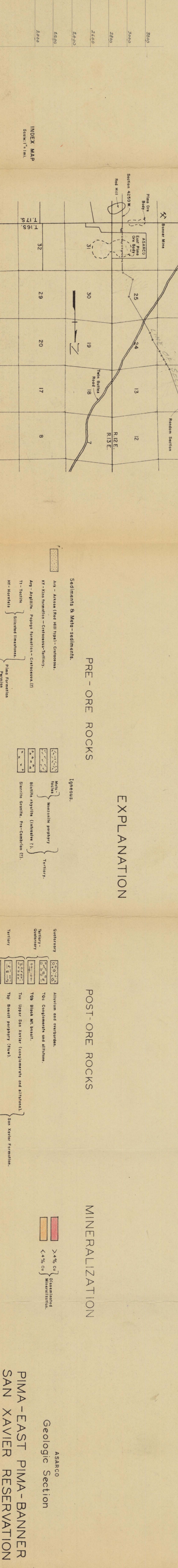
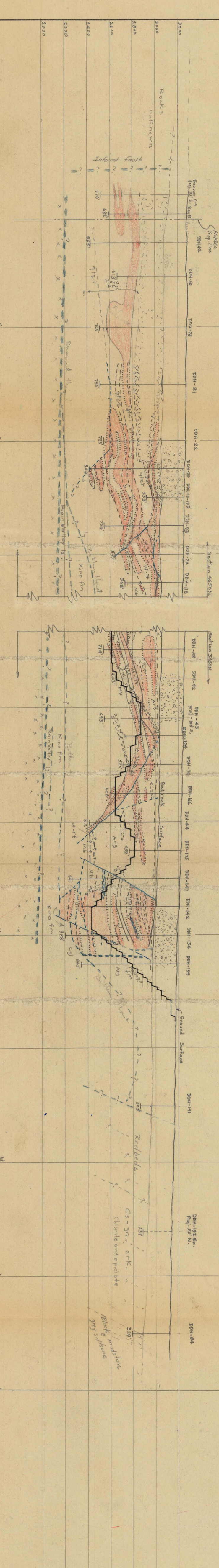
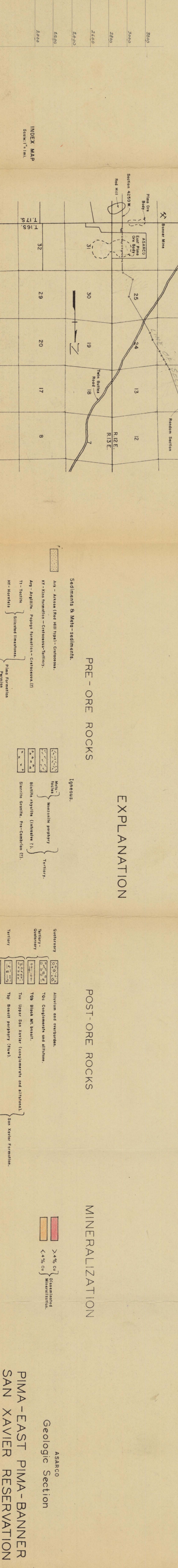
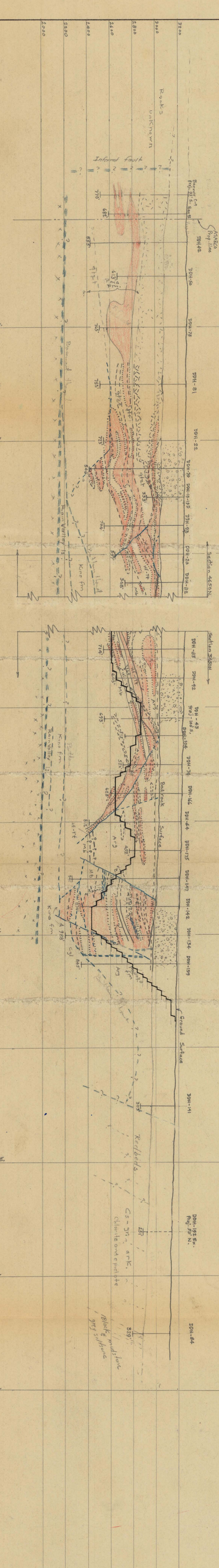
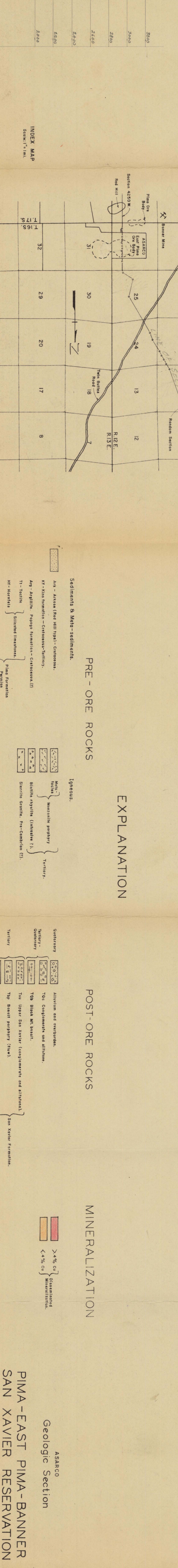
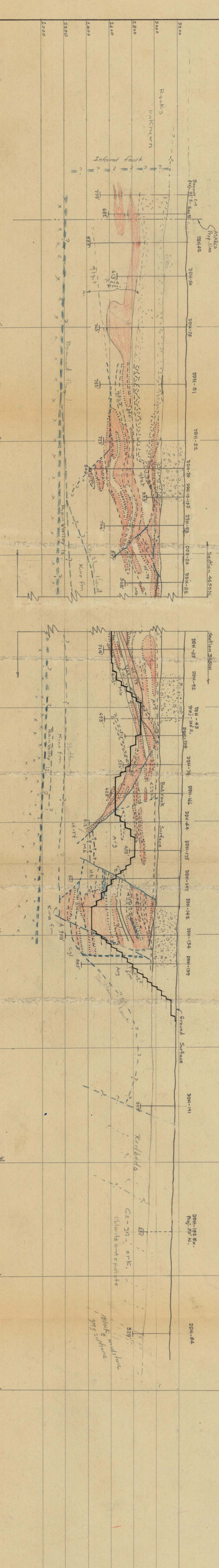
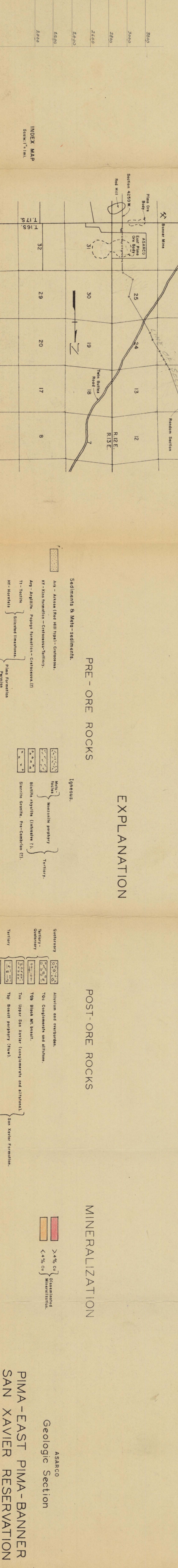
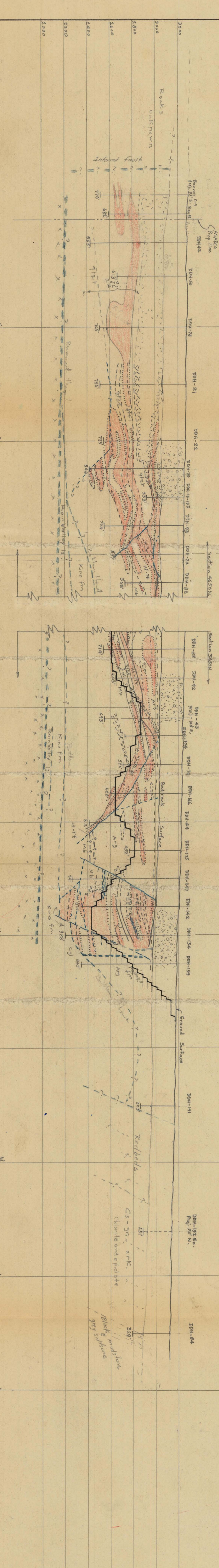
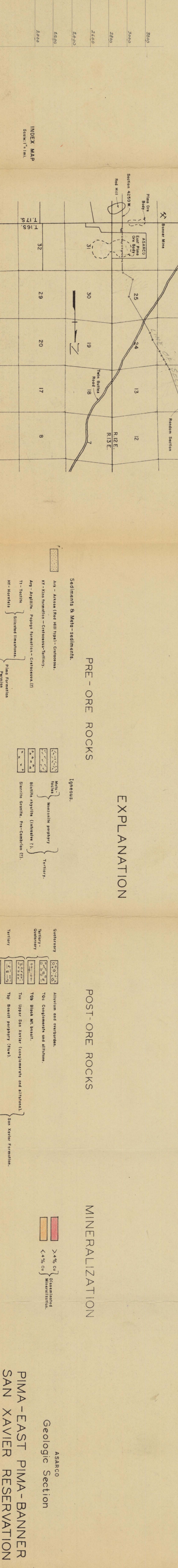
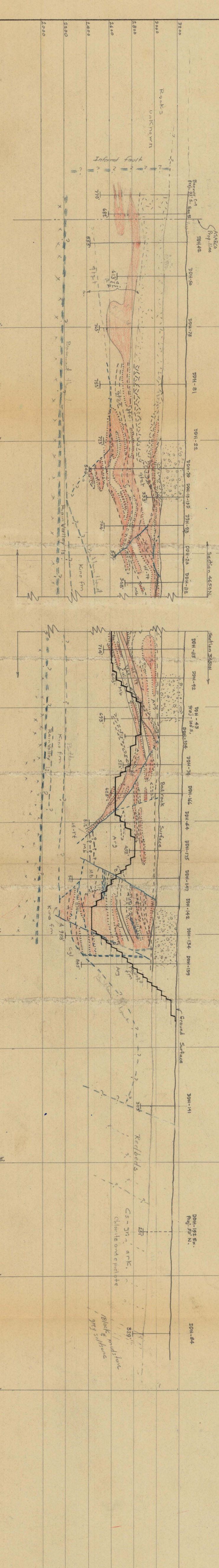
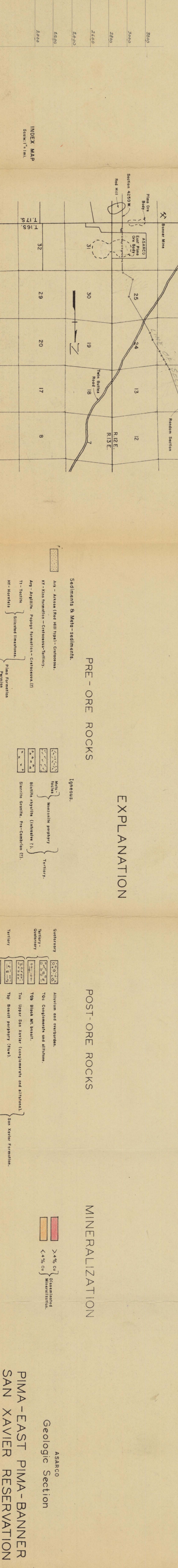
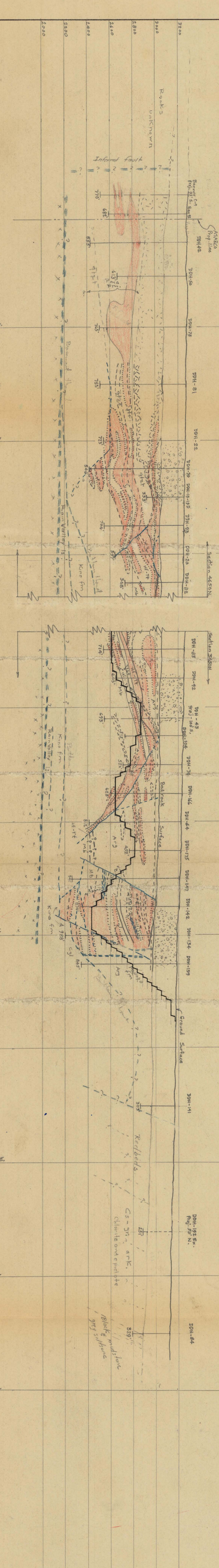
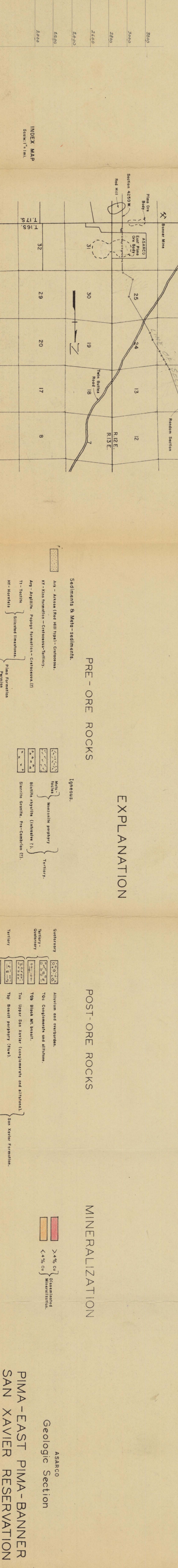
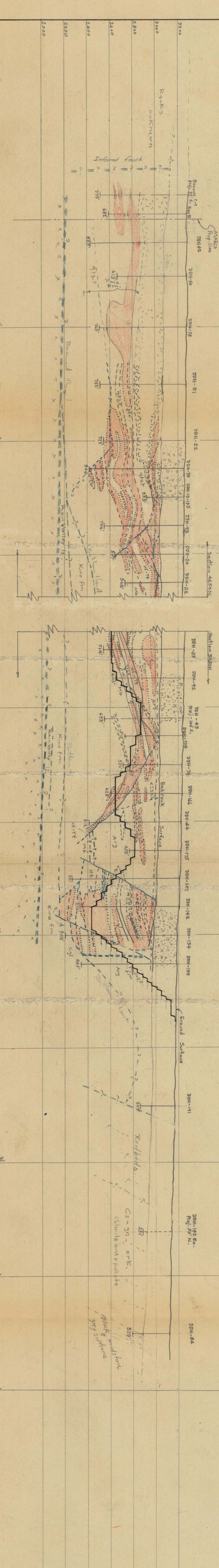
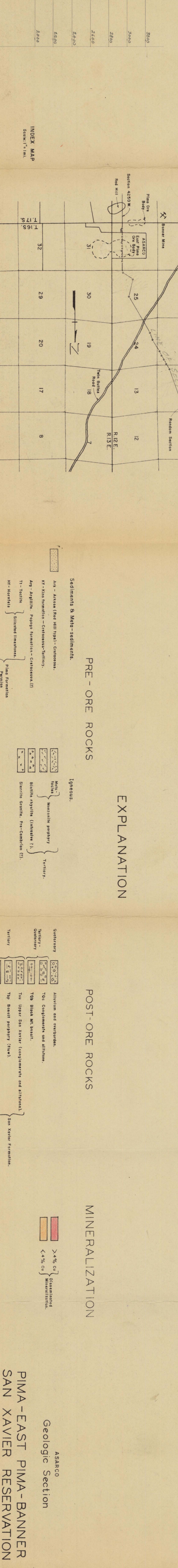
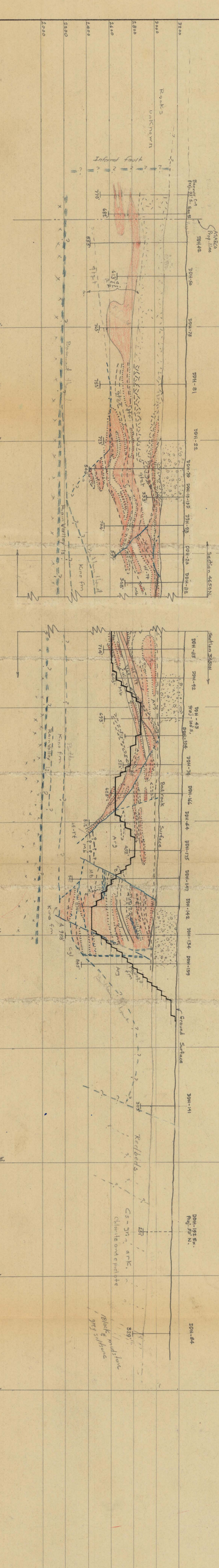
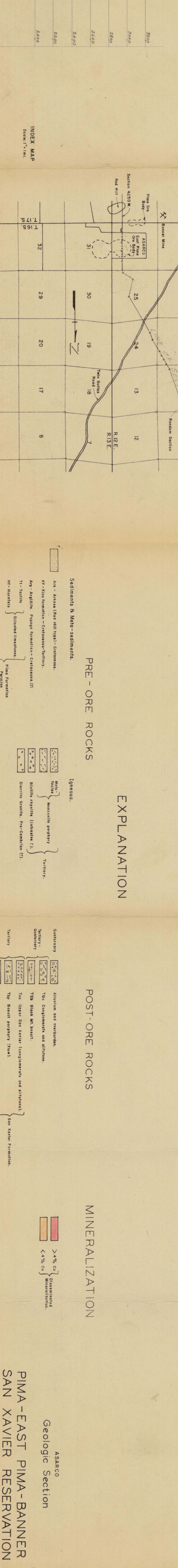
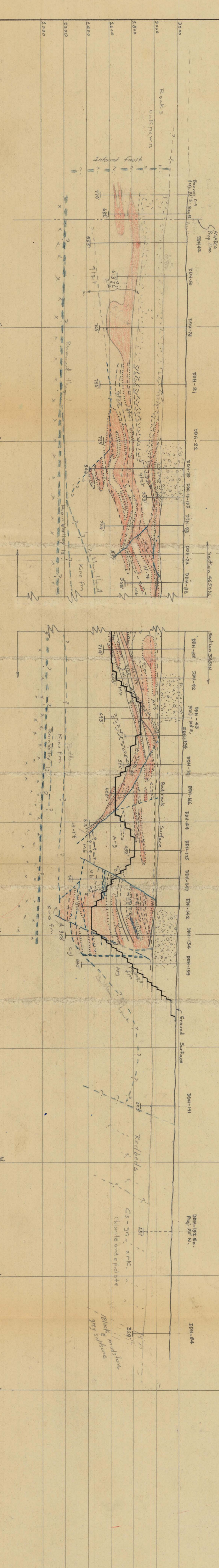
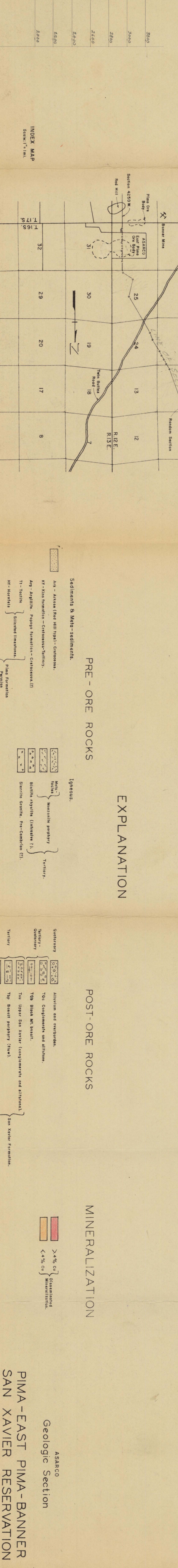
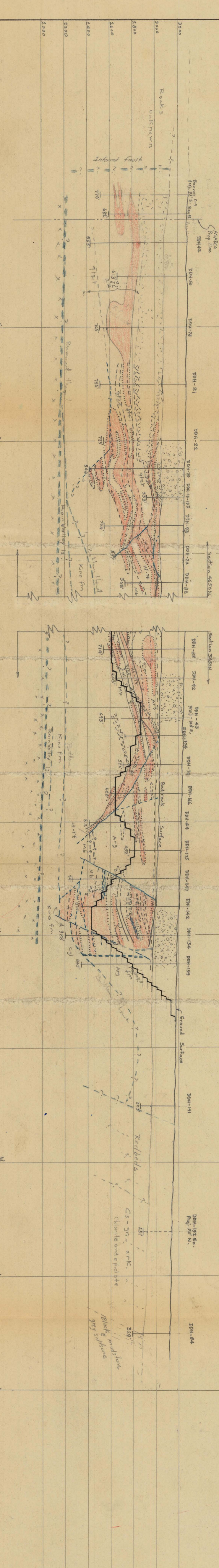
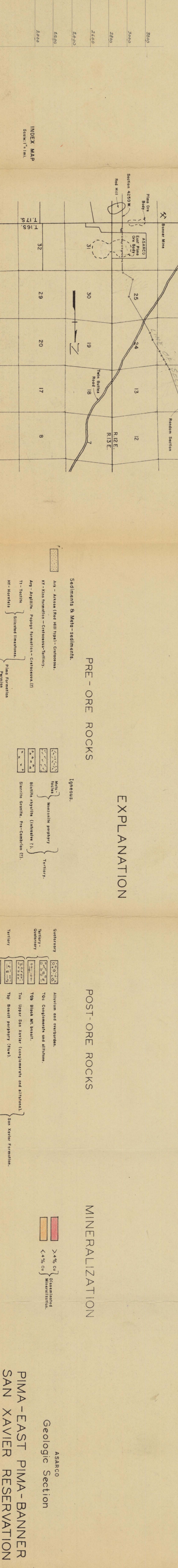
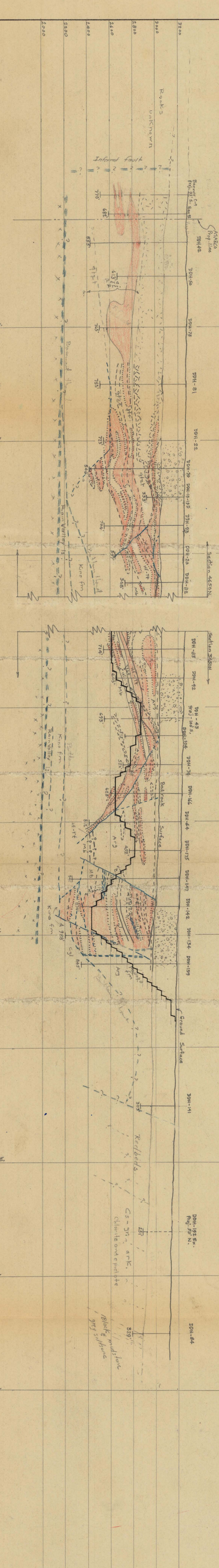
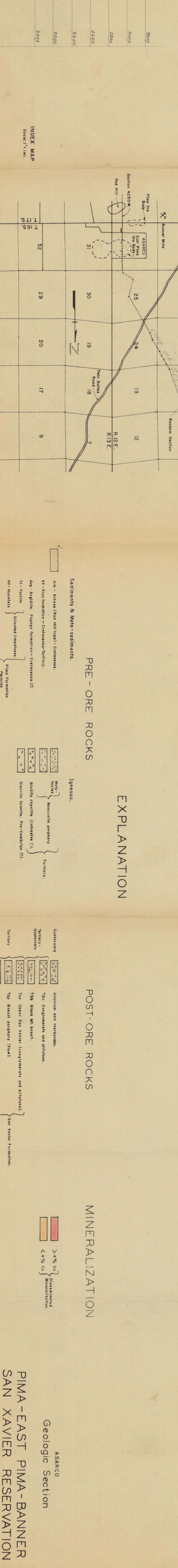
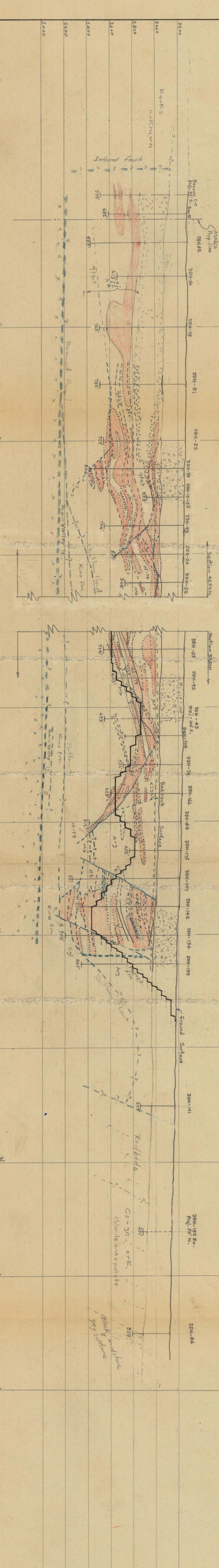
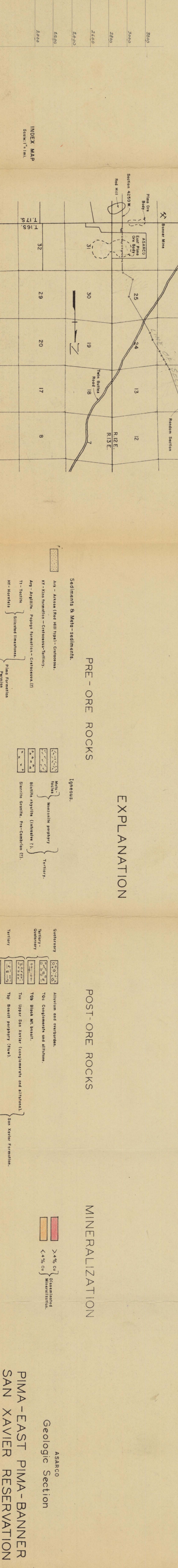
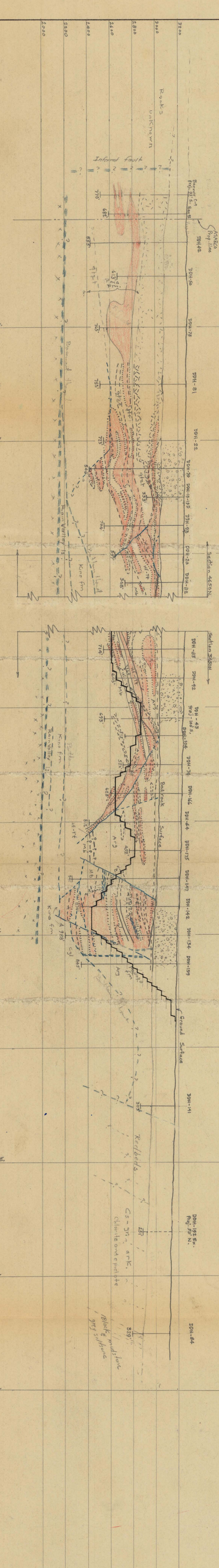
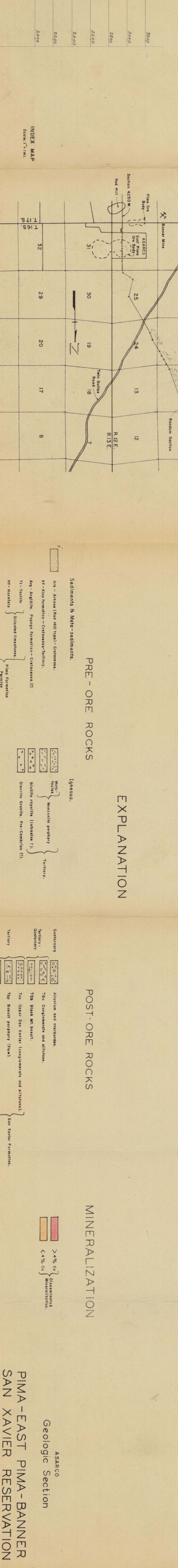
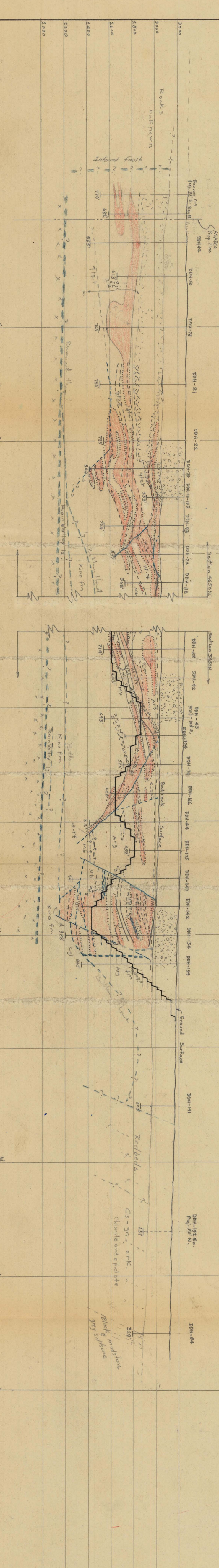
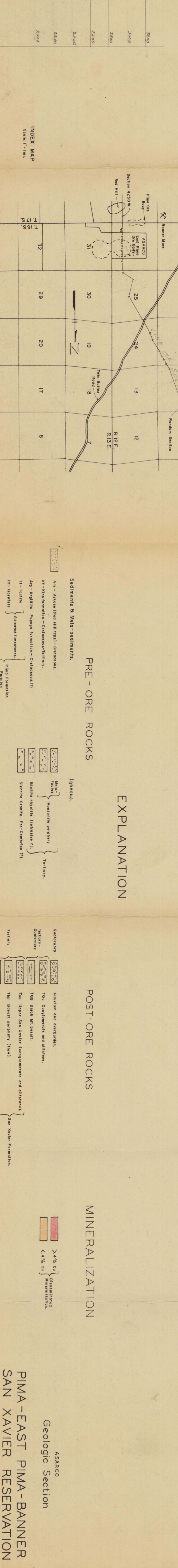
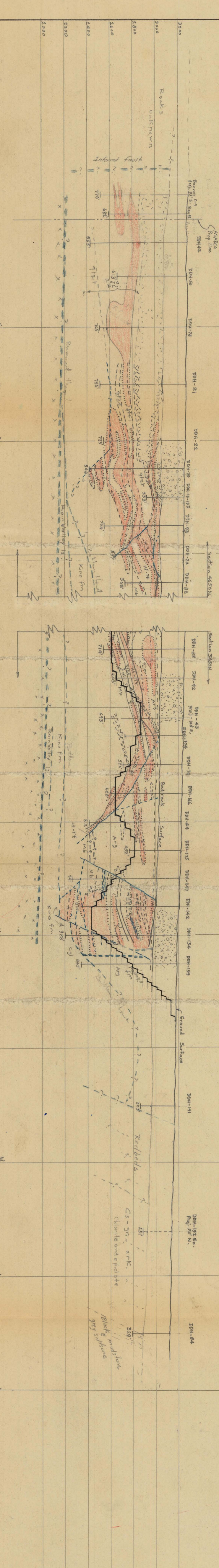
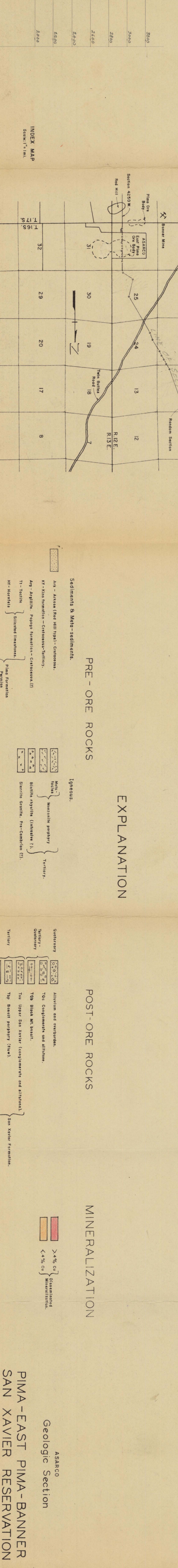
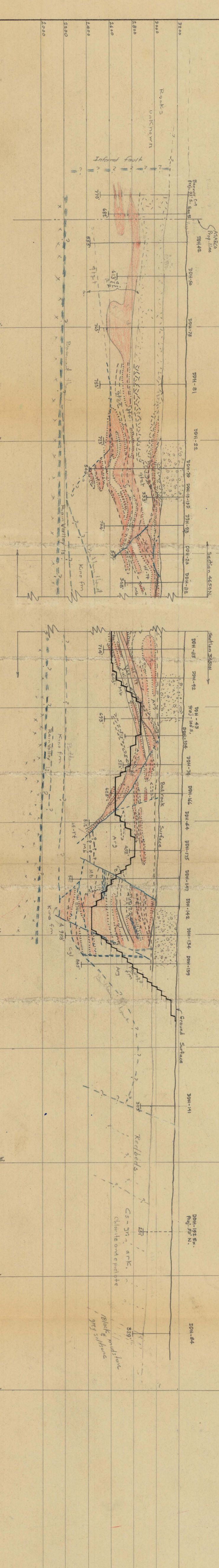
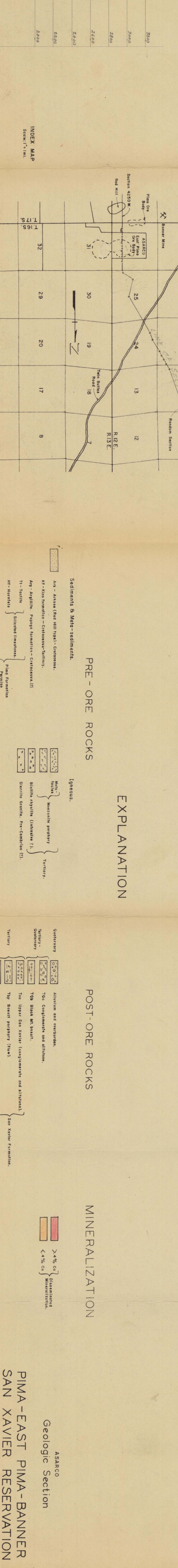
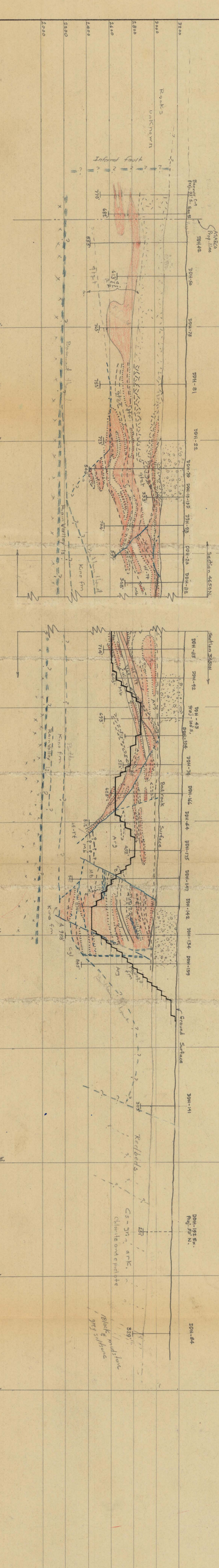
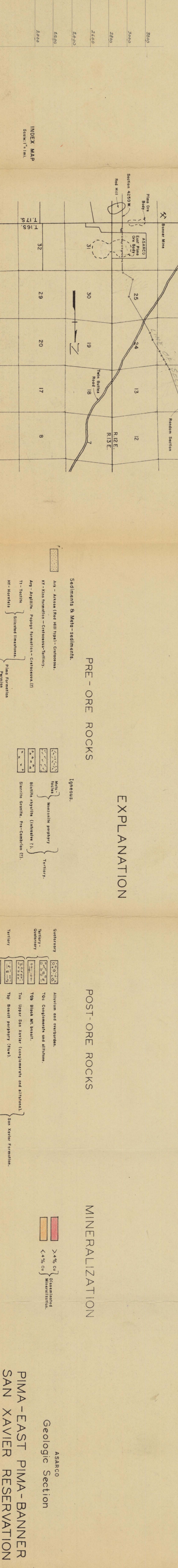
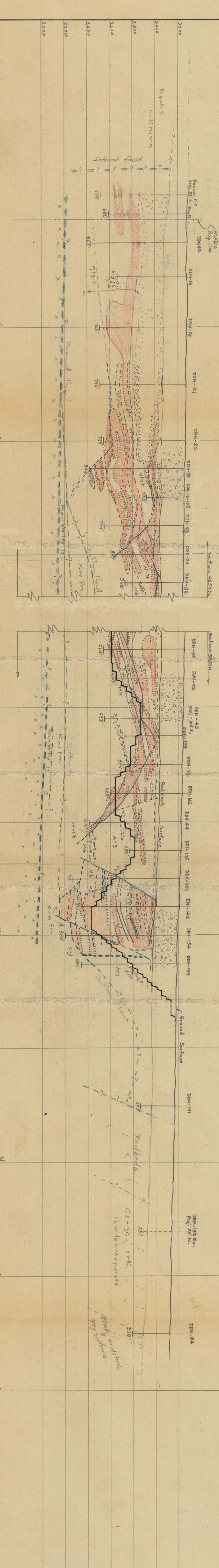
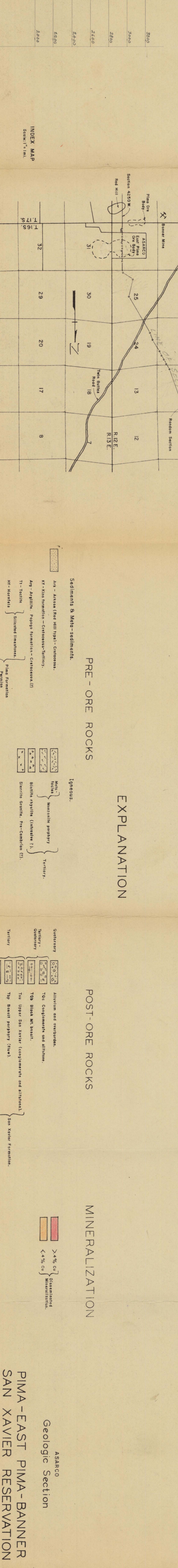
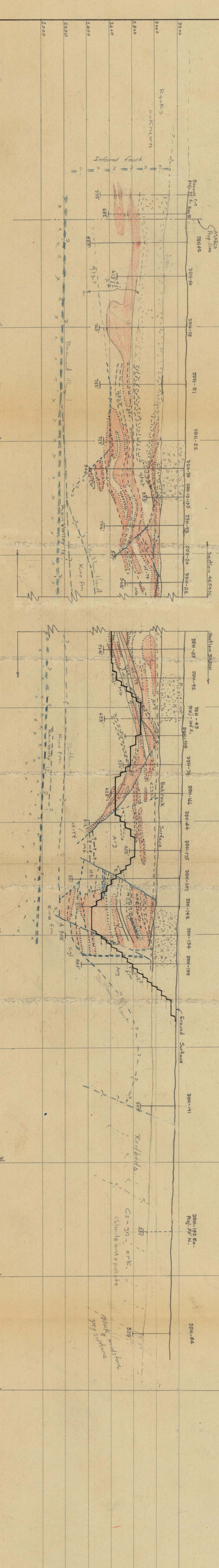
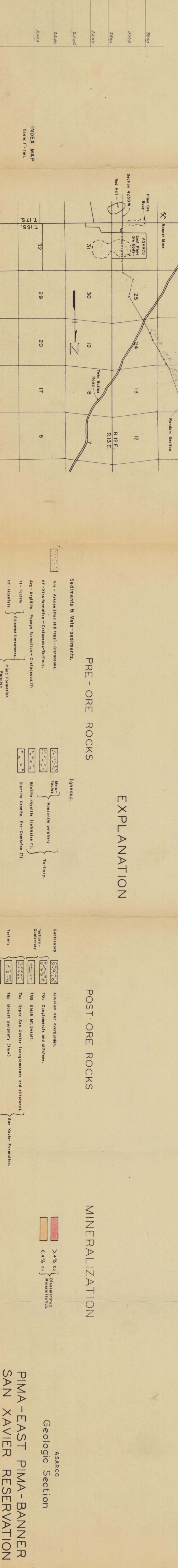
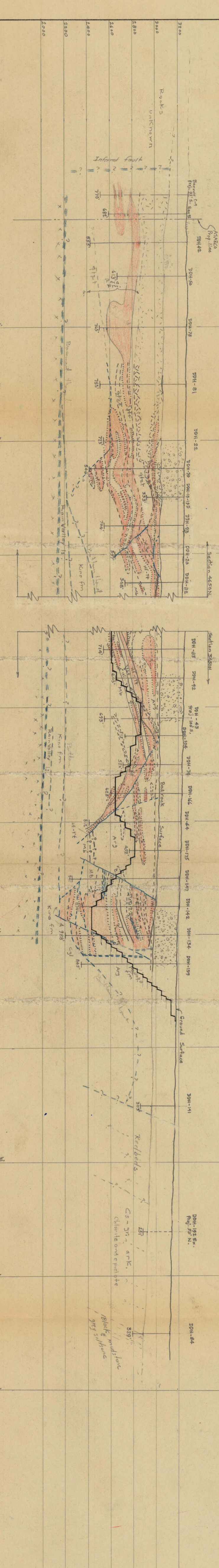
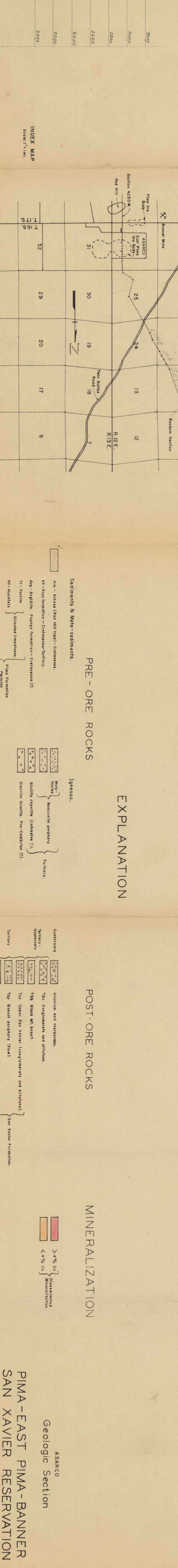
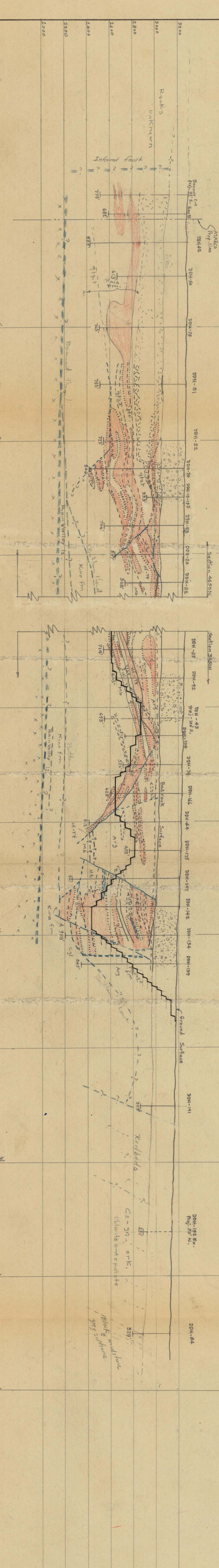
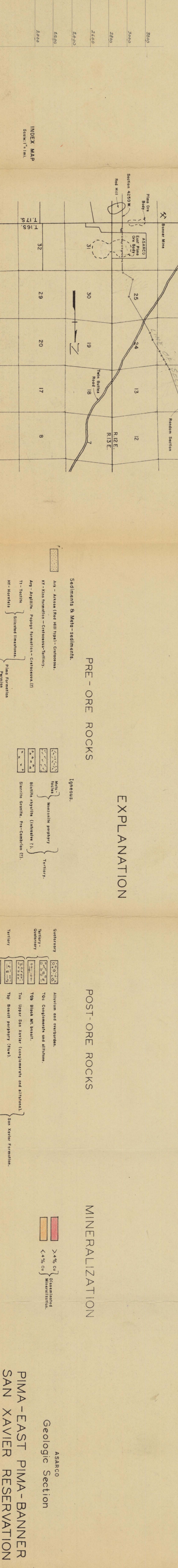
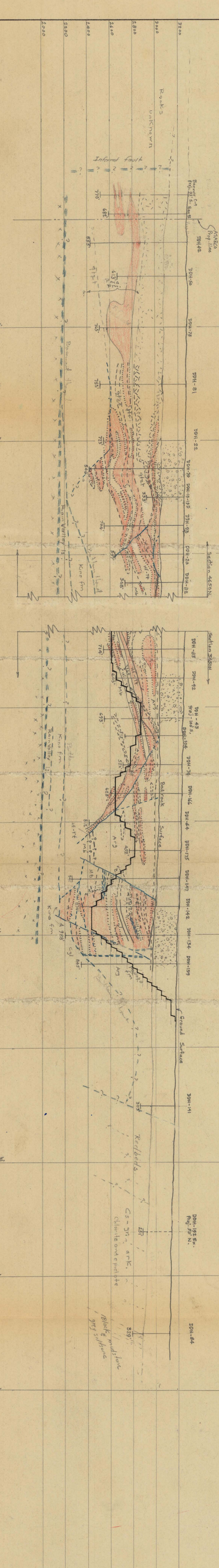
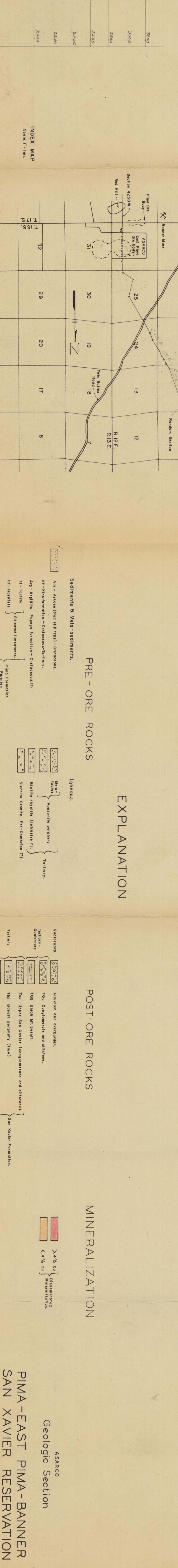
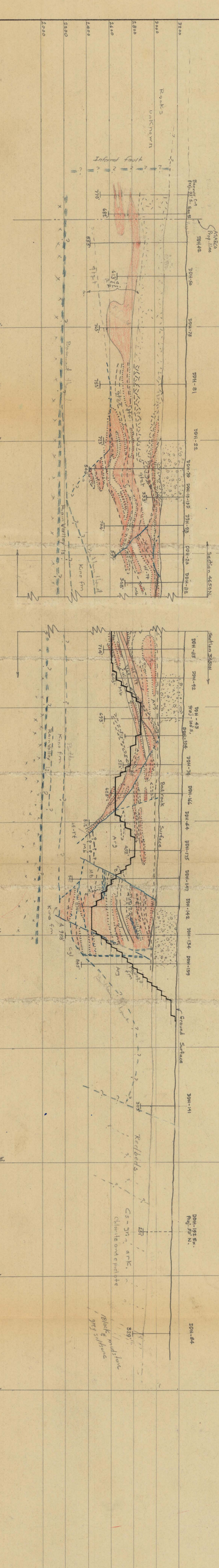
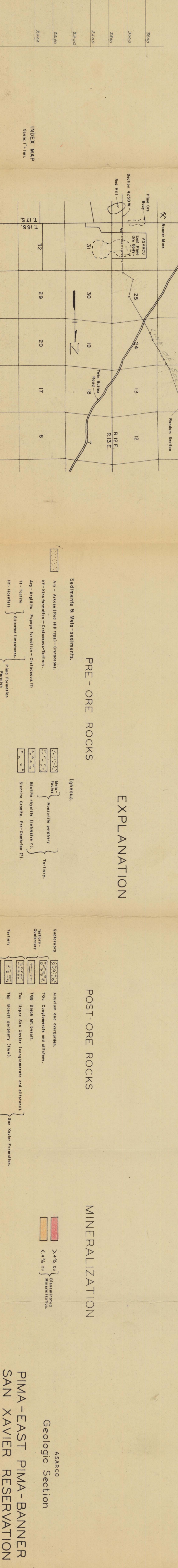
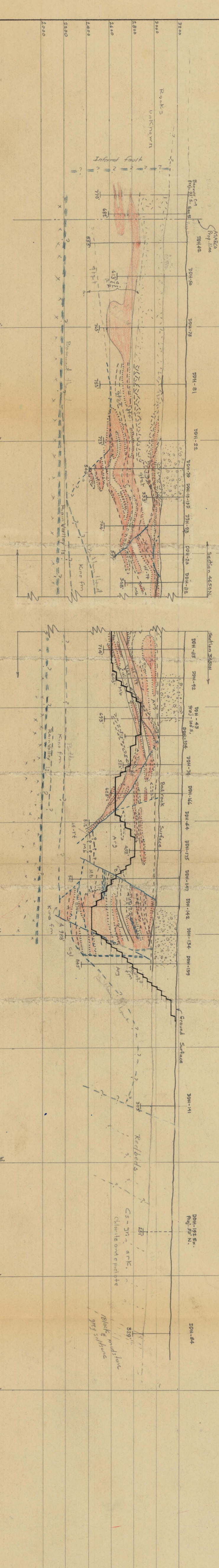
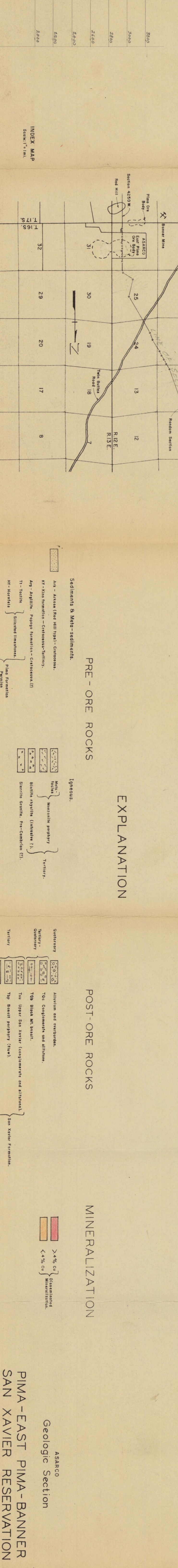
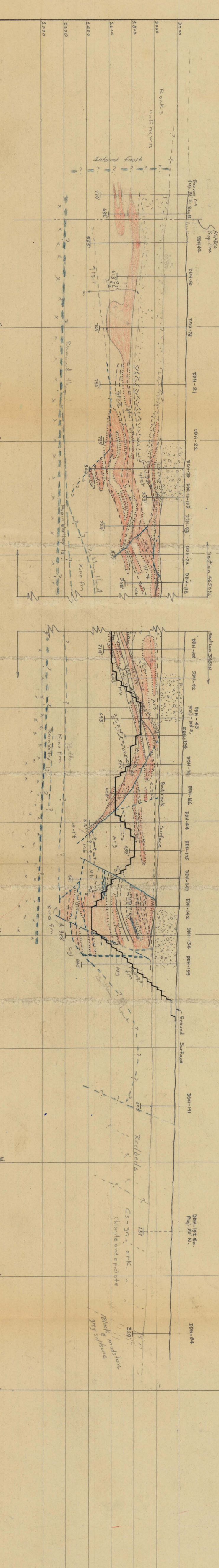
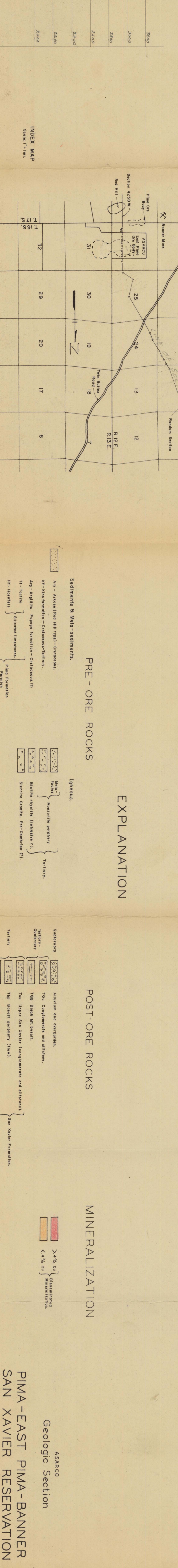
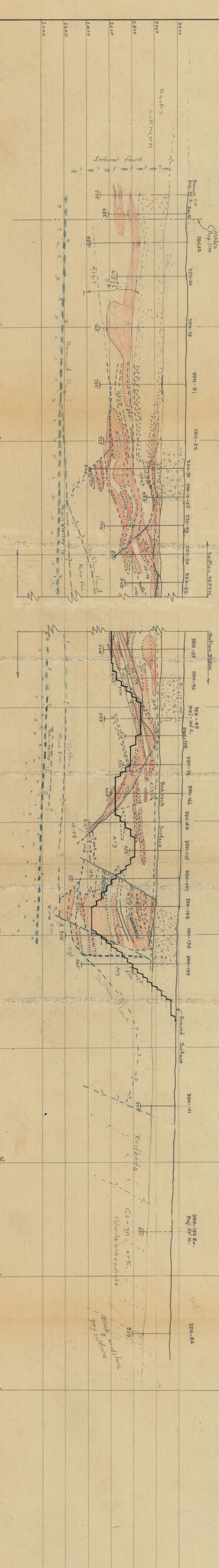
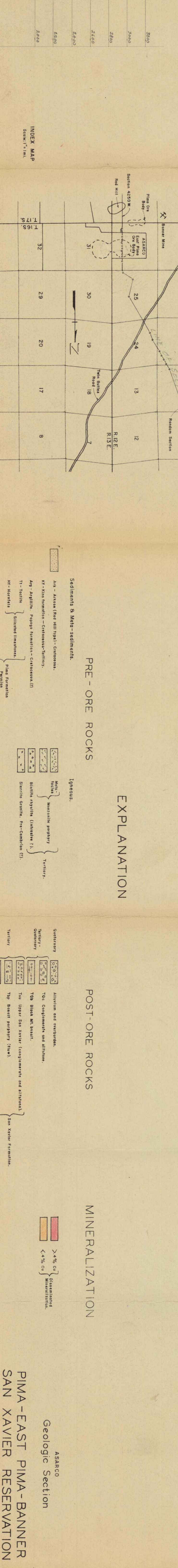
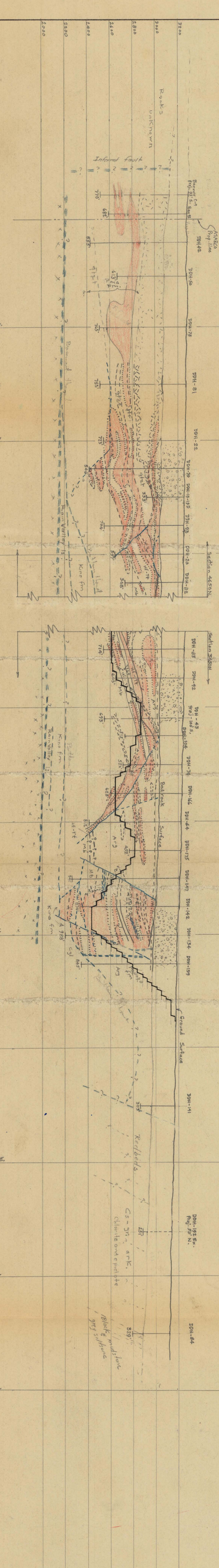
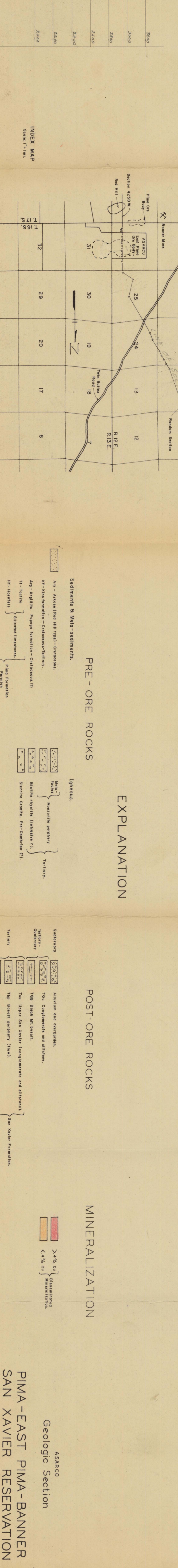
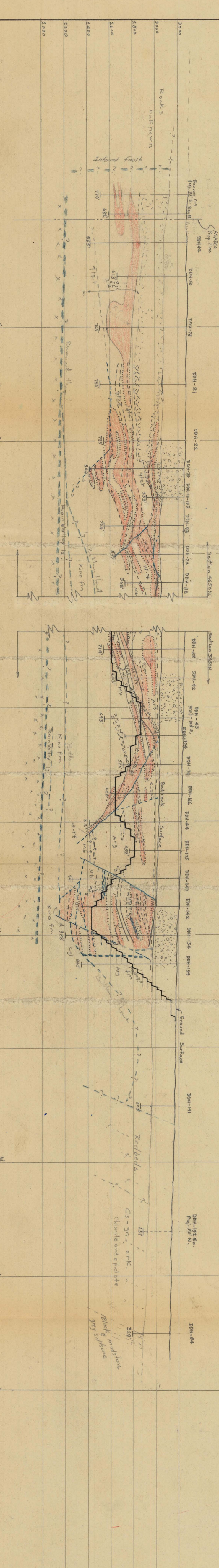
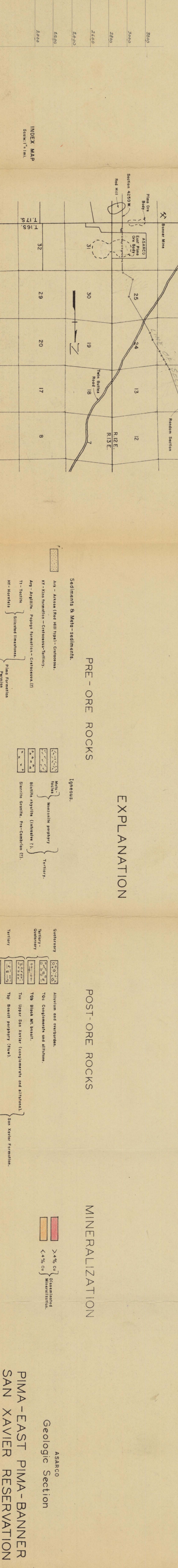
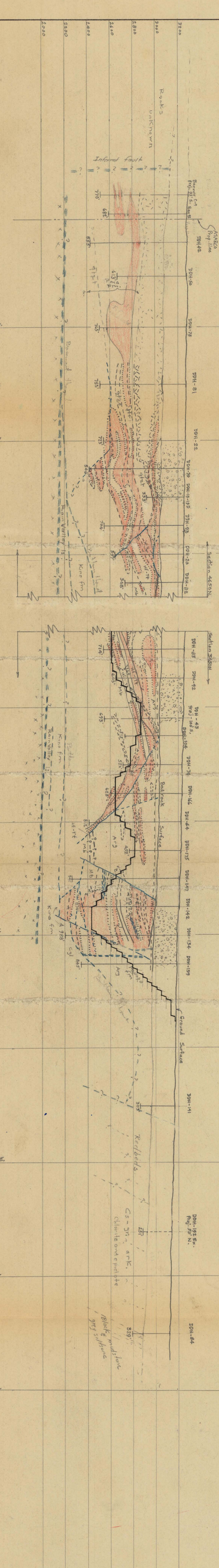
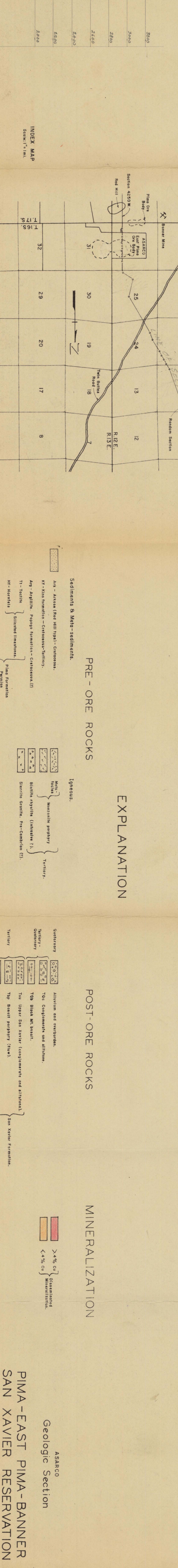
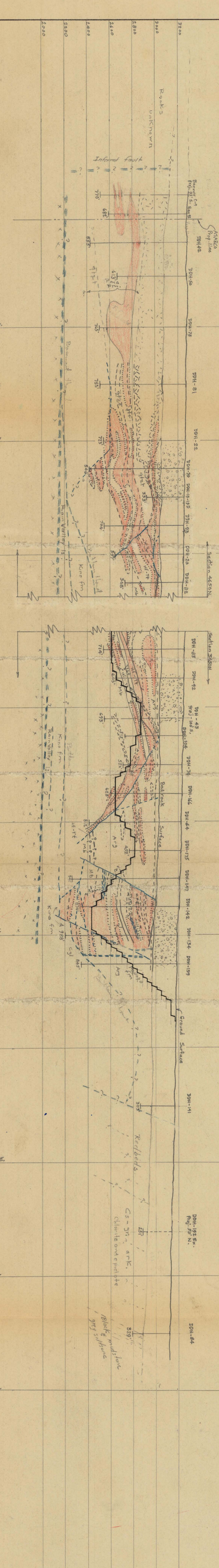
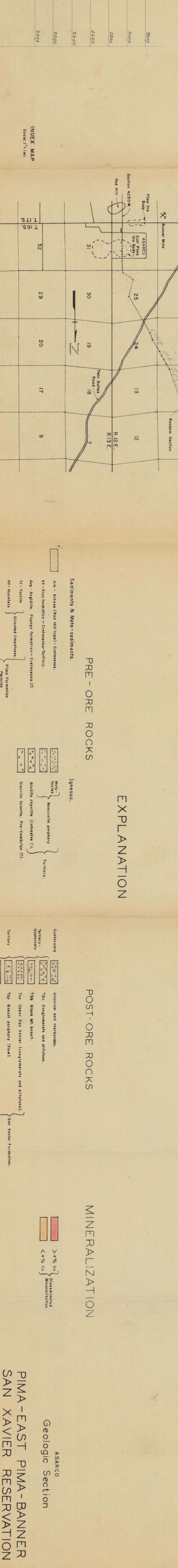
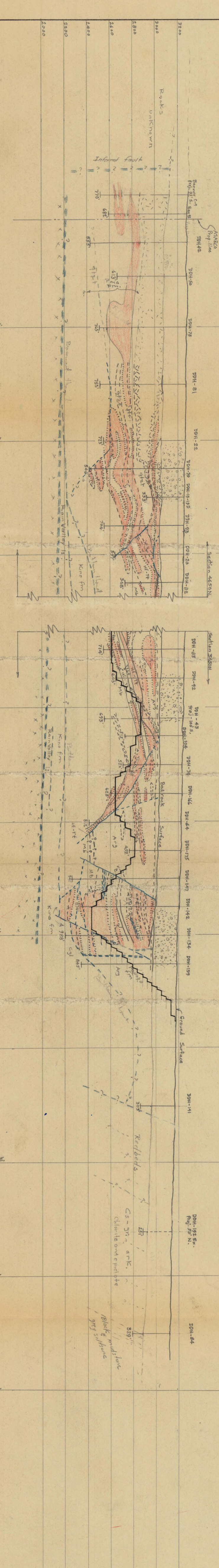
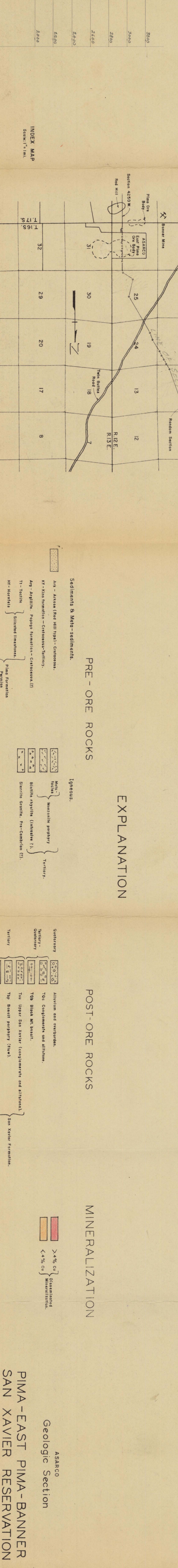
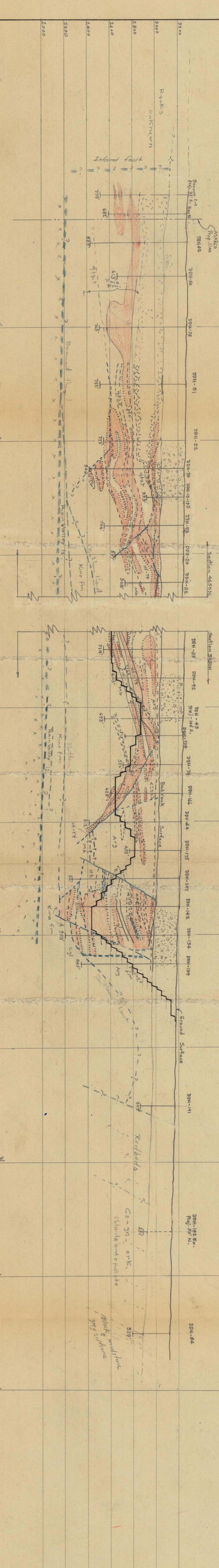
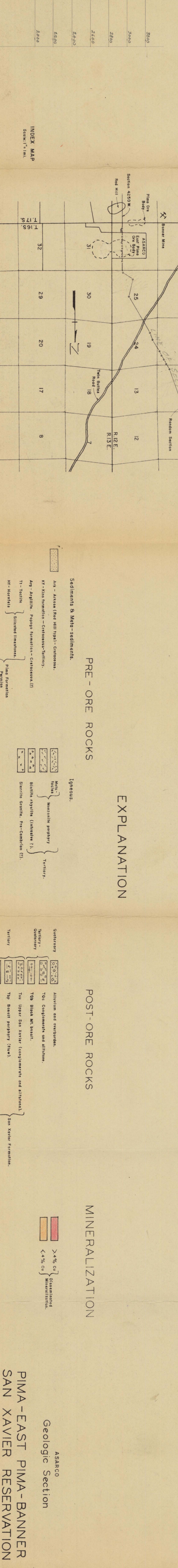
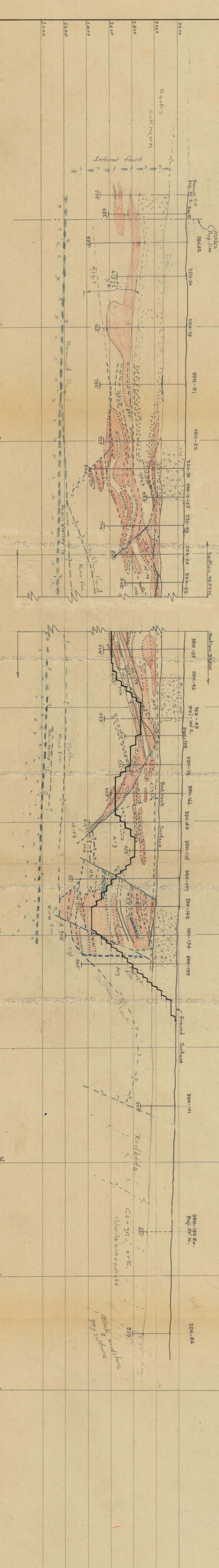
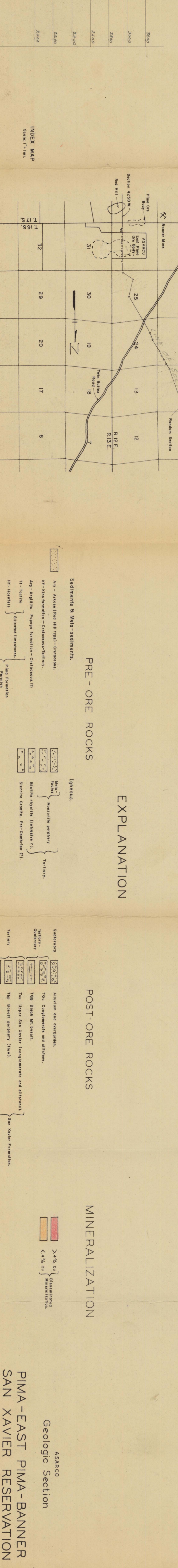
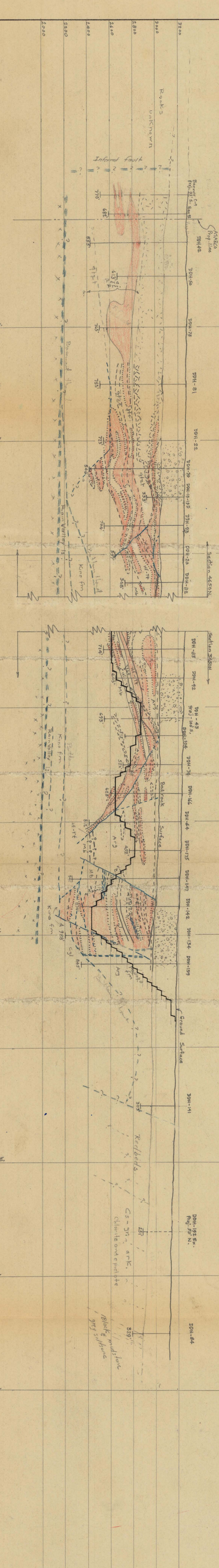
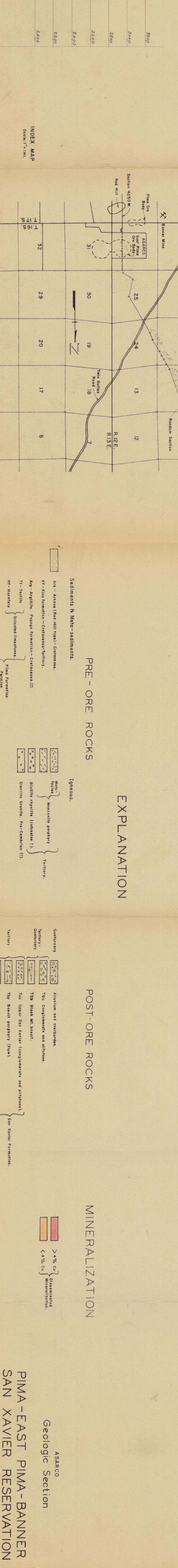
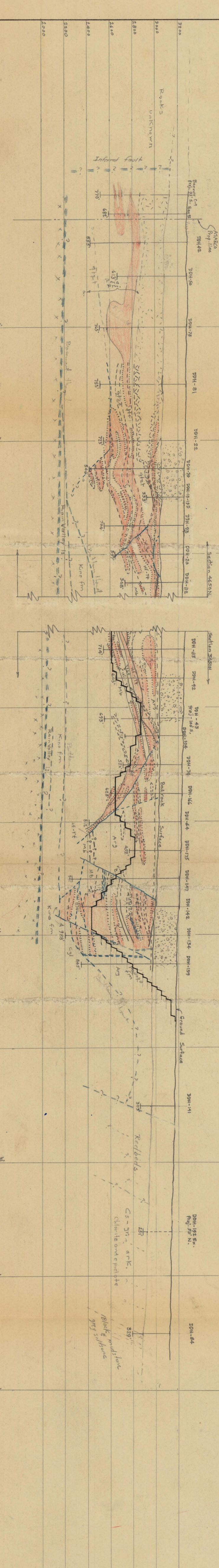
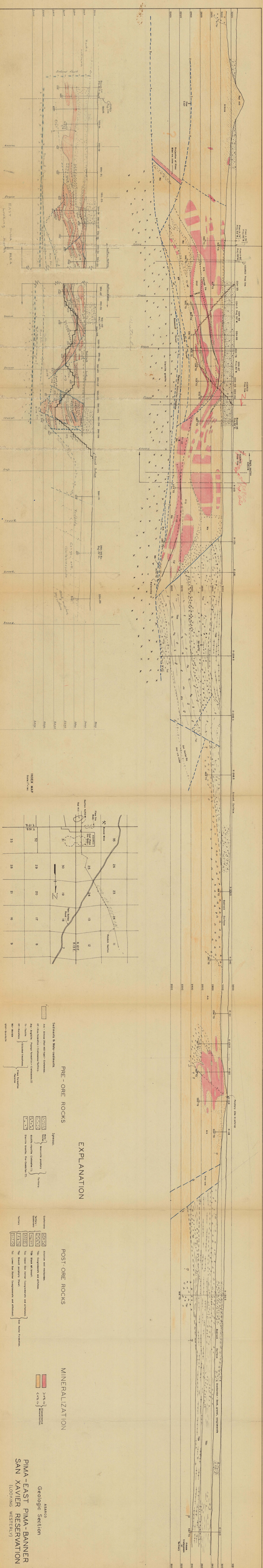
CONSTRAINTS STATEMENT

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

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

QUALITY STATEMENT

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



SUMMARY - DIAMOND DRILL HOLE NO. X-140
366.5N EE W Collar Elevation 3400'

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Rec.%</u>	<u>Core</u>	<u>Geology</u>
0.0	11.1	11.1	-	-	<u>Rockbit</u> through drill pad and loose surface debris. Bedrock at 3.5'.
11.1	14.0	2.9	73	0.03	<u>Rhyolite</u> . Probably Biotite rhyolite. Feldspars strongly kaolinized. Contains irregular Bx areas. Abundant thick seams of earthy red hematite. Also strong diss. vugs of py(?) with "live" Limonite. Zn Tr, Ag 0.1 oz. Assays.
14.0	24.5	10.5	89	0.02	<u>Rhyolite</u> , similar to above. Strong argillic alt. Diss sulphide cavities with live limonite. First 3' contains several 3" zones of massive red hematite. Rock is Bx throughout, and cemented with hematite. Assays: Zn Tr, Ag 0.1 oz.
24.5	33.9	9.4	96	0.01	<u>Conglomerate or Bx and Arkose</u> . Run begins with 3" of fine breccia, hematite matrix. Somewhat resembles sandstone. Vague stratification dips 0-10°. This grades into the conglomerate or breccia, which is composed of angular to well rounded frags of fine to coarse arkose, set in a matrix of red hematite. The frags do not touch each other, and the matrix comprises about 30% of rock. Low angle stratification or shearing is present. The frags show leached sulphide(?) cavities. Rock hard. The bottom 1.5' is a coarse-gr. arkose flooded with orange red hematite. This unit is shattered, granulated, and locally coarsely brecciated. Assays: Zn tr, Ag 0.2 oz.
33.9	42.4	8.5	89	0.02	<u>Arkose</u> , similar to rock at end of previous run. Flooded with orange-red hematite, shattered and locally Bx. Assays: Zn Tr, Ag 0.1 oz.
42.4	52.4	10.0	96	-	<u>Arkose and conglomerate or breccia</u> . Arkose, similar to above, extends to 45.9'. This unit is shattered, and locally brecciated. Stained with orange limonite. From 45.9-46.1' is a brecciated, bleached phase, of next unit. This is a black, shattered siltstone, and extends to 49.4'. Locally brecciated. This contacts, with a tight gradational Bx contact, the conglomerate or Breccia, which consists of rounded to angular fragments of arkose set in a red sand or crushed matrix.
52.4	62.1	9.7	96	-	<u>Conglomerate or Breccia, and Sandstone</u> . The former, similar to last unit of previous run, extends to a sedimentary appearing contact at 58.2'. Below is San Xavier fm. consisting of alternating 1/2-3" beds of sandstone with a mud and clay binder. Stratification dips about 22°. Color brown-red.
62.1	74.9	12.8	85	-	<u>Sandstone</u> , similar to above. Contains several beds up to 1/2', of brown claystone. Bottom foot is gray-brown coarse sandstone. Dips vary from less than 10 to 30°.

SUMMARY - DDE No. X-140 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
74.9	86.0	11.1	74	-	<u>Sandstone and conglomerate.</u> The former begins with a <u>gradational contact</u> at the beginning of the run. It is red brown, with scattered pebbles. Stratification dips 0-15°. This extends to about 78'. Here it contacts a red conglomerate with angular, weakly alt. arkose, pebbles. Matrix is red muddy sand. Bottom foot is composed of a yellow clayey matrix. No mineralization. These rocks probably San Xavier fm.
86.0	96.4	10.4	81	-	<u>Conglomerate</u> , similar to above. To 89.6' the matrix is yellow clay, and below is red muddy sand.
96.4	103.3	6.9	83	-	<u>Conglomerate</u> , red, similar to above.
103.3	113.4	10.1	44	-	<u>Conglomerate and Fault breccia.</u> The conglomerate, similar to above, extends to about 104'. Below this is a 4" core of alt arkose with weak limonite. Below this is a loose fault breccia, containing fragments of gray arkose with py. To a depth of 112' red mud and oxidized frags from the conglomerate are mixed with the fault breccia. Below this depth the breccia is entirely of arkose with py, in a chloritic gouge. Py is smeared through the gouge matrix. At one place there is a suggestion of 45° shearing, but elsewhere no lineation is apparent. Cu content nil.
113.4	130.7	17.3	40	-	<u>Breccia.</u> Consists of gray arkose frags, in a goudy chloritic matrix. Py is diss. in the frags, and is broken and crushed(?) through matrix. The pyrite of matrix is in small cubic crystals and as larger slightly broken grains. Sulphides much heavier in matrix than in fragments.
130.7	134.0	3.3	27	-	<u>Red Brown Sandy Mud and Gray Pyritic Arkose.</u> Probably fault zone initiating next rock type.
134.0	144.5	10.5	73	-	<u>Sandstone</u> , brown fine to coarse-grained, silty. Dips of sorted stratified layers vary from 5 to 18°, averaging about 15°. This unit probably correlates to San Xavier formation.
144.5	153.1	8.6	73	-	<u>Sandstone</u> , similar to above. Down to 146.2' the core shows some faulting, and contains gypsum veins. A few gypsum veins occur elsewhere. Dips are 20-30°.
153.1	164.3	11.2	85	-	<u>Sandstone</u> , similar to above. Dips 20-25°.
164.3	170.1	5.8	83	-	<u>Sandstone, siltstone and fault.</u> Sandstone similar to above, dipping 17-30°, gives way to brown, sandy siltstone at 166.1'. Below 167.7' are a few wavy shear zones, and the last foot of run is strongly sheared. Shear zone dips average about 30°.

SUMMARY - DDH No. X-140 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
170.1	179.4	9.3	83	-	<u>Fault zone and granite.</u> This run begins with a shear zone in red brown mudstone, and extends to 171.2' where it contacts a zone of mixed granitic material sheared, and lenses of red mudstone. This mixed zone extends to 172.2'. Shear planes in this zone dip 25-45°. Below 172.2' the rock is crushed Sierrita granite.
179.4	194.1	14.7	93	-	<u>Fault and Marble.</u> The first 0.6' is sheared granite. Below 180.0' the rock is coarse-grained white marble. No mineralization present.
194.1	205.4	11.3	82	-	<u>Fault and granite.</u> A fault zone begins the run and extends to 196.4'. This zone consists of crushed granite to 195.1', a 1" gouge zone, and then a gray, alt. siltstone with clear qtz grains extends to 196.2'. 0.2' of sheared granite extends to the base of the fault zone. Fault planes dip 10-17°. Crushed Sierrita granite lies below the fault, and becomes more solid toward end of the run. No mineralization present.
205.4	214.8	9.4	84	-	<u>Sierrita granite.</u> Coarse-grained granite. Chlorite alt. Some small grains of black hematite, probably after biotite or some other mafic mineral. No mineralization present.
214.8	226.7	11.9	81	-	<u>Sierrita granite,</u> similar to above.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE NO. X-140

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	11.1	11.1	Rockbit		-	No Sludge
11.1	14.0	2.9	-	-	0.03	-
14.0	24.5	10.5	88.6	-	0.02	-
24.5	33.9	9.4	95.5	-	0.01	-
33.9	42.4	8.5	89.6	-	0.02	-
42.4	52.4	10.0	95.5	-	-	-
52.4	62.1	9.7	96.4	-	-	-
62.1	74.9	12.8	84.8	-	-	-
74.9	86.0	11.1	-	-	-	-
86.0	96.4	10.4	-	-	-	-
96.4	103.3	6.9	-	-	-	-
103.3	113.4	10.1	-	-	-	-
113.4	130.7	17.3	-	-	-	-
130.7	134.0	3.3	-	-	-	-
134.0	144.5	10.5	-	-	-	-
144.5	153.1	8.6	-	-	-	-
153.1	164.3	11.2	-	-	-	-
164.3	170.1	5.8	-	-	-	-
170.1	179.4	9.3	-	-	-	-
179.4	194.1	14.7	-	-	-	-
194.1	205.4	11.3	-	-	-	-
205.4	214.8	9.4	-	-	-	-
214.8	226.7	11.9	-	-	-	-

B o t t o m

SUMMARY - DIAMOND DRILL HOLE NO. X-139
376.0N AA W Collar Elevation 3210'

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	95.0 ⁺	95.0	-	-	Rockbit. Alluvium of granitic composition.
95.0 ⁺	115.0 ⁺	20.0	-	-	Rockbit. <u>Caliche conglomerate.</u>
115.0 ⁺	173.0	58.0	-	-	Rockbit. <u>Conglomerate.</u> Character samples indicate contact at about 115'; the conglomerate contains red basaltic rocks, fresh and weakly alt. Biotite rhyolite, altered arkose, and alt. porphyry. Alt is sericitic-kaolin, with py limonite.
173.0	177.0	4.0	98	-	<u>Conglomerate</u> , made of pebbles 3/4-1" on the average, with numerous boulders 2" to 6" in size. The smaller frags. are: Biotite rhyolite, fresh and weakly alt.; red basalt; red siltstone(?); ark of various grain-sizes, alt. and fresh; dark green aphanitic rocks. The larger frags. are: red basalt with fine feldspar needles; red, brown, and gray ark; andesite porphyry -- black with white small feld. pheno.; minor amounts of alt porphyry or biotite rhy; and a few pieces of basalt porphyry. Formation is post ore and is not affected by alteration or mineralization.
177.0	214.0	37.0	-	-	Rockbit. <u>Conglomerate.</u> Character samples similar to last core run.
214.0	217.0	3.0	93	-	<u>Conglomerate</u> , similar to above. Pebbles 1/4 - 1/2" mostly. Few small cobbles. Fragments are alt. ark, alt biotite rhy, red basalt, and other fine-grained igneous (andesitic) rocks. One frag. of basalt porph. Bedding is vaguely shown by alignment of elongated frags., and is horizontal.
217.0	268.0	51.0	-	-	Rockbit.
268.0	270.0	2.0	90	-	<u>Conglomerate and coarse granule-sandstone.</u> Both types contain rock fragments similar to preceding runs. Cgl contains up to 1" frags, and overlies the granule-sandstone, which is composed of similar frags, up to 1/4" size. No basalt porph. observed.
270.0	320.0	50.0	-	-	Rockbit.
320.0	322.5	2.5	100	-	<u>Conglomerate.</u> Alternating 1'± layers of cobble and pebble conglomerate. No bedding planes exist, but the contact between different grain sizes is fairly sharp and more or less horizontal. Fragments are similar to previous cores. One fragment of diop. Hf (slight amount resid. calcite) with chloritic alt. bands. One frag. Sierrita granite. One frag. fine-gr red basalt with shiny red specks.
322.5	373.0	50.5	-	-	Rockbit. Similar to above described core.

Summary - DDE No. X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
373.0	377.0	4.0	100	-	Conglomerate, similar to above. Few frags. of basalt porph. No biotite rhy. Large frag of purple biotite andesite(?) -- a type which occurs in small frags in preceding cores. Zones of cobbles and pebbles are thinner, and still more or less horiz. Sierrita gr. present.
377.0	418.0	41.0	-	-	Rockbit. Cuttings similar to above described core.
418.0	422.0	4.0	100	-	Conglomerate, similar to previous core run. Slightly more red fine-gr basalt. Alt ark and igneous rocks are present.
422.0	472.0	50.0	-	-	Rockbit. Cuttings similar to above described core.
472.0	476.0	4.0	95	-	Conglomerate, similar to previous core. Few 2-3" layers of coarse sandstone, and a few scattered 6" cobbles. Basalt porph present. Some alt biotite rhy.
476.0	526.0	50.0	-	-	Rockbit. Cuttings similar to above described core.
526.0	530.0	4.0	55	-	Conglomerate. Similar frag types as in preceding core run. Frags generally larger -- about 1". Basalt porph, alt ark and biotite rhy are present.
530.0	580.0	50.0	-	-	Rockbit. Cuttings similar to above described core.
580.0	584.0	4.0	50.0	-	Conglomerate, similar to 472-476'. Alt frags present. No basalt porph.
584.0	634.0	50.0	-	-	Rockbit. Cuttings similar to above described core.
634.0	640.0	6.0	90	-	Conglomerate, similar to preceding core. Basalt porph more numerous. One boulder of red basalt with aligned, elongated amygdules, penetrated 6". Vague suggestion of bedding is approx horizontal.
640.0	690.0	50	-	-	Rockbit. Cuttings similar to above described core. The rock-type change which occurs in this interval is not apparent by the cuttings.
690.0	695.0	5.0	96	-	Conglomerate, which is in texture similar to previous cores. The matrix, however, is more distinctly tan in contrast to more reddish color in preceding runs. Frags of basalt porph are numerous. One cobble of arkose with weak py(?) Lim. appears similar to Pima fm. arkoses. Fresh and weakly alt biotite rhy, and purple biotite andesite(?) are numerous. Weakly amygduloidal basalt w/needle-like phenocrysts are present. A 3" zone of stratified sandstone dips 15°. Other red and green fine-gr igneous rocks, also seen in cores above, are present.

Summary - DDH No. X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
695.0	743.8	48.8	-	-	<u>Rockbit.</u> Cuttings similar to above described core.
743.8	749.2	5.4	100	-	<u>Conglomerate</u> , similar to above. Matrix is coarse sand and granules. Basalt porph in small and large frags. Alt ark present. Many frags fairly well rounded.
749.2	755.4	6.2	97	-	<u>Conglomerate</u> , similar to above. More consolidated, and is now a fairly hard rock. Near bottom is a 1 ft. boulder of amygduloidal basalt. Numerous frags of purple biotite andesite. Other frags include red basalt, andesite porph, partly epidotized, and altered ark -- locally epidotized. (This run begins NX wireline core).
755.4	765.4	10.0	98	-	<u>Conglomerate</u> , similar to above. Inter-bedded zones of stratified sand and granules dip 20°. Abundant ark and igneous rocks with weak py alt. Silver Bell-type andesite porphyry, epidotized, is also abundant. Basalt porphyry frags common.
765.4	775.4	10.0	99	-	<u>Conglomerate</u> , similar to above. Granule zones dip 25°.
775.4	785.4	10.0	100	-	<u>Conglomerate</u> , similar to above. More abundant basalt porph frags, some of which are a variety with very many large pheno in a red matrix with visible magnetite. Thin bed of red-brown silt dips 25°. Granule zones dip about 15°.
785.4	795.4	10.0	100	-	<u>Conglomerate</u> , similar to above. A 1' frag of red-speckled andesite is present.
795.4	805.4	10.0	100	-	<u>Conglomerate</u> , similar to above. Much of the run is granule-sized. Vague stratification shows gentle dips. At 804' is an 0.8' penetration of medium gray porphyritic andesite. Contacts dip 45°, parallel. Probably this is a thin dike.
805.4	815.5	10.1	99	-	<u>Conglomerate</u> , similar to above. Stratification dips 15°.
815.5	825.6	10.1	100	-	<u>Conglomerate</u> , similar to above. Two 6" boulders, one of amygduloidal basalt, and one of red-speckled andesite.
825.6	835.6	10.0	96	-	<u>Conglomerate</u> , similar to above. Stratified sand zone dips 20°.
835.6	845.6	10.0	100	-	<u>Conglomerate</u> , similar to above. Alt ark common, showing weak py lin.
845.6	855.6	10.0	100	-	<u>Conglomerate</u> , similar to above. One frag of black ls. A thin fault dips 45°. 5" boulder of amygduloidal black basalt.

Summary - DDH No. X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
855.6	865.6	10.0	100	-	<u>Conglomerate</u> , similar to above. Sand layers dip 20°. Numerous frags of basalt porph, Silver-Bell-type fm., and alt ark.
865.6	875.6	10.0	100	-	<u>Conglomerate</u> , similar to above. One pebble of Pal(?) ls.
875.6	885.7	10.1	100	-	<u>Conglomerate</u> , similar to above.
885.7	895.8	10.1	99	-	<u>Conglomerate</u> , similar to above. A few 6"-12" boulders in upper half of run. One of these boulders is an amygduloidal brown basalt.
895.8	905.9	10.1	98	-	<u>Conglomerate</u> , similar to above. Vague stratification of granule layers at 10-15°.
905.9	915.9	10.0	100	-	<u>Conglomerate</u> , similar to above. A 1.4' sandstone layer near bottom. frag of basalt porph. Zone 0.3' brown
915.9	926.0	10.1	99	-	<u>Conglomerate</u> , similar to above. Granule and sand zones prevalent. Stratification dips 40°.
926.0	936.0	10.0	99	-	<u>Conglomerate</u> , similar to above. Boulder of basalt porph and of a biotite andesite.
936.0	946.0	10.0	100	-	<u>Conglomerate</u> , similar to above. Dips 30°.
946.0	956.1	10.1	99	-	<u>Conglomerate</u> , similar to above. Considerable red brown sand.
956.1	966.1	10.0	100	-	<u>Conglomerate</u> , similar to above. Half of run is granule-sized.
966.1	976.1	10.0	100	-	<u>Conglomerate</u> , similar to above. Red brown sandy and silty matrix more dominant than in previous runs. Abundant basalt porph.
976.1	986.2	10.1	98	-	<u>Conglomerate</u> , similar to above. Stratification dips 40°. Red brown sandy matrix. Frags are basalt porphyry, red brown andesite, gray-green andesite of "Silver Bell" type, and alt arkose and siltstone. One frag amyg. red basalt.
986.2	996.2	10.0	99	-	<u>Conglomerate</u> , similar to above.
996.2	1005.6	9.4	97	-	<u>Conglomerate</u> , similar to above. Large frags amyg. red, and brown basalt, dips 45°. 2 steep (60-80°) calcite, vuggy, fractures.

Summary - DDH No. X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
1005.6	1015.7	10.1	100	-	<u>Conglomerate</u> , similar to above, stratification 20-40°.
1015.7	1025.8	10.1	100	-	<u>Conglomerate</u> , similar to above. Matrix distinctly more red brown. More frags Silver Bell type andesite. Large frag brown amyg. basalt.
1025.8	1035.9	10.1	100	-	<u>Conglomerate</u> , similar to above. Pebbles most common size of frag, sub-angular.
1035.9	1046.0	10.1	99	-	<u>Conglomerate</u> , similar to above. Dips 40°.
1046.0	1056.1	10.1	96	-	<u>Conglomerate</u> , similar to above.
1056.1	1066.2	10.1	95	-	<u>Conglomerate</u> , similar to above. Some red amyg. basalt.
1066.2	1076.0	9.8	100	-	<u>Conglomerate</u> , similar to above. 2 boulders (12", 15") are of brown amyg basalt.
1076.0	1086.1	10.0	100	-	<u>Conglomerate</u> , similar to above. A thin zone of laminated mud dips 40°.
1086.1	1096.1	10.0	100	-	<u>Conglomerate</u> , similar to above.
1096.1	1106.2	10.1	97	-	<u>Conglomerate</u> , similar to above. 1' bed of red sandstone.
1106.2	1116.1	9.9	100	-	<u>Conglomerate</u> , similar to above. 12" boulder of brown slightly amyg. basalt. Upper contact of the boulder is a 70° slip.
1116.1	1126.1	10.0	98	-	<u>Conglomerate</u> , similar to above. One boulder basalt. Calcite filled fissure parallels core near end of run.
1126.1	1136.1	10.0	99	-	<u>Conglomerate</u> , similar to above. Local frag alignment forms vague and variable stratification, dipping 45-70°. Abundant basalt por.
1136.1	1146.2	10.1	99	-	<u>Conglomerate</u> , similar to above. Suggestion of steep stratification.
1146.2	1156.3	10.1	100	-	<u>Conglomerate</u> , similar to above. Numerous thin mud zones or gouge slips cut core at various angles. One boulder amygduloidal red basalt.
1156.3	1166.3	10.0	100	-	<u>Conglomerate</u> , similar to above. Most of run is granule-sized. Thin gouge or mud zones prominent.

Summary - DDE No. X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
1166.3	1176.4	10.1	99	-	<u>Conglomerate</u> , similar to above. Central 4' contains abundant cobbles of basalt por.
1176.4	1189.4	13.0	97	-	<u>Conglomerate</u> , similar to above. Small slips or mud zones. This run displays rather inconspicuous wavy, discontinuous shear or granulation zones. No displacement is indicated but the granules appear to have been locally rotated in their muddy matrix. This type of structure also occurred in the previous 3 runs.
1189.4	1196.6	7.2	93	-	<u>Mudstone</u> . Contact with overlying conglomerate is at beginning of run. Contact is irregular, paralleling core for 3" and then cutting out. Slight granulation in conglomerate parallel to contact. Mudstone is dark red, about 2 1/2 hardness, and contains decayed(?) fragments of red brown basalt(?). Mudstone becomes soft in the last foot. No mineralization present.
1196.6	1205.8	9.2	17	-	<u>Mudstone and conglomerate(?)</u> Mudstone, soft and sandy, similar to last foot of preceding run, extends to 1198.1', where a horizontal or low-angle contact occurs with a conglomerate(?). Only about 0.1' of lower unit is recovered. This consists of pebbles of igneous(?) rock. No mineralization present.
1205.8	1227.6	21.8	8	-	<u>Conglomerate</u> , high core loss. Zone makes water. Recovered fragments are pebbles and cobbles of andesite and weakly alt arkose. Two short cores of conglomerate show a red muddy matrix.
1227.6	1237.7	10.1	67	-	<u>Conglomerate</u> . Pebbles and cobbles of weakly alt. arkose and argillite, and purple andesite are set in a grey-brown sandy matrix to 1131.1', and below this point the same type of frags are in a red sandy matrix. Some of the alt rocks show dissulf(?) cavities, but no indication of Cu. This run is much more indurated than previous run, but is not hard and compact like the conglomerates above 1189.4. Stratified lenses dip horizontal or at low angles.
1237.7	1247.8	10.1	69	-	<u>Conglomerate</u> , similar to red portion of previous run. Stratification may dip as much as 10°. One boulder of Pima fm type argillite, but without trace of Cu.
1247.8	1256.7	8.9	66	-	<u>Conglomerate</u> , similar to above. Interbedded zones of cobbles and granules, 1/2-1' each bed. Dips about 10°. Thin layers sandstone. Gypsum forms seams along bedding. Frags are alt ark, purple andesite, and arg and congl of Papago-Kine type. Matrix is brown red.
1256.7	1264.2	7.5	80	-	<u>Conglomerate</u> , similar to above. Dips 12-18°.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE X-139
Started: 6-9-59 Completed: 7-30-59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	173.0	173.0	-	-	-	No Sludge
173.0	177.0	4.0	97.5	-	-	-
177.0	214.0	37.0	-	-	-	-
214.0	217.0	3.0	93.4	-	-	-
217.0	268.0	51.0	-	-	-	-
268.0	270.0	2.0	90.0	-	-	-
270.0	320.0	50.0	-	-	-	-
320.0	322.5	2.5	100.0	-	-	-
322.5	373.0	50.5	-	-	-	-
373.0	377.0	4.0	105.0	-	-	-
377.0	418.0	41.0	-	-	-	-
418.0	422.0	4.0	102.5	-	-	-
422.0	472.0	50.0	-	-	-	-
472.0	476.0	4.0	95.0	-	-	-
476.0	526.0	50.0	-	-	-	-
526.0	530.0	4.0	55.0	-	-	-
530.0	580.0	50.0	-	-	-	-
580.0	584.0	4.0	50.0	-	-	-
584.0	634.0	50.0	-	-	-	-
634.0	640.0	6.0	90.0	-	-	-
640.0	690.0	50.0	-	-	-	-
690.0	695.0	5.0	96.0	-	-	-
695.0	743.8	48.8	-	-	-	-
743.8	749.2	5.4	103.8	-	-	-
749.2	755.4	6.2	96.9	-	-	-
755.4	765.4	10.0	98.0	-	-	-
765.4	775.4	10.0	99.0	-	-	-
775.4	785.4	10.0	101.0	-	-	-
785.4	795.4	10.0	100.0	-	-	-
795.4	805.4	10.0	100.0	-	-	-
805.4	815.5	10.1	99.0	-	-	-
815.5	825.6	10.1	100.0	-	-	-
825.6	835.6	10.0	96.0	-	-	-
835.6	845.6	10.0	100.0	-	-	-
845.6	855.6	10.0	100.0	-	-	-
855.6	865.6	10.0	100.0	-	-	-
865.6	875.6	10.0	100.0	-	-	-
875.6	885.7	10.1	100.0	-	-	-
885.7	895.8	10.1	99.0	-	-	-
895.8	905.9	10.1	98.0	-	-	-
905.9	915.9	10.0	100.0	-	-	-
915.9	926.0	10.1	99.0	-	-	-
926.0	936.0	10.0	99.0	-	-	-
936.0	946.0	10.0	100.0	-	-	-
946.0	956.1	10.1	99.0	-	-	-
956.1	966.1	10.0	100.0	-	-	-

ASSAY DATA - DDH X-139 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
966.1	976.1	10.0	100.0	-	-	No Sludge
976.1	986.2	10.1	98.0	-	-	-
986.2	996.2	10.0	99.0	-	-	-
996.2	1005.6	9.4	96.9	-	-	-
1005.6	1015.7	10.1	100.0	-	-	-
1015.7	1025.8	10.1	100.0	-	-	-
1025.8	1035.9	10.1	100.0	-	-	-
1035.9	1046.0	10.1	99.0	-	-	-
1046.0	1056.1	10.1	96.0	-	-	-
1056.1	1066.2	10.1	95.1	-	-	-
1066.2	1076.0	9.8	102.0	-	-	-
1076.0	1086.1	10.1	100.0	-	-	-
1086.1	1096.1	10.0	100.0	-	-	-
1096.1	1106.2	10.1	97.0	-	-	-
1106.2	1116.1	9.9	100.0	-	-	-
1116.1	1126.1	10.0	98.0	-	-	-
1126.1	1136.1	10.0	99.0	-	-	-
1136.1	1146.2	10.1	99.0	-	-	-
1146.2	1156.3	10.1	100.0	-	-	-
1156.3	1166.3	10.0	100.0	-	-	-
1166.3	1176.4	10.0	99.0	-	-	-
1176.4	1189.4	13.0	97.1	-	-	-
1189.4	1196.6	7.2	93.1	-	-	-
1196.6	1205.8	9.2	17.4	-	-	-
1205.8	1227.6	21.8	8.3	-	-	-
1227.6	1237.7	10.1	67.2	-	-	-
1237.7	1247.8	10.1	69.3	-	-	-
1247.8	1256.7	8.9	66.4	-	-	-
1256.7	1264.2	7.5	80.0	-	-	-
1264.2	1266.7	2.5	-	-	-	-

Bottom

SUMMARY - DIAMOND DRILL HOLE NO. X-264
XX.25E 366.25N Collar Elevation 3205.9

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core</u> <u>Rec. %</u>	<u>% Cu</u> <u>Core</u>	<u>Geology</u>
0.0	208.0	208.0	Drilled with Rock Bit		<u>Overburden</u> - Composed of alluvial sands and gravels.
208.0	214.7	6.7	"	"	<u>Basalt</u> - Bedrock contact established from driller's report and character samples. The basalt appears hematite red, very fine grained, and exhibits minute (less than 1 mm) white plagioclase feldspar phenocrysts. Fragments bear appreciable magnetite. Probably weathered in some zones.
214.7	217.0	2.3	100	-	<u>Basalt</u> - Similar to above. Hematite red, very fine grained, with the white feldspar phenocrysts creating a felty texture. Lower portion of run exhibits small, elongated blebs or amygdulites of white calcite with a rough inclination of 30-50°. Last 2.5-3.0' of run mustard brown. Fairly high percentage of magnetite throughout. No mineralization or alteration.
217.0	260.0	43.0	Drilled w/rock bit		<u>Basalt</u> - Character samples indicate it to be similar to above.
260.0	262.0	2.0	80	-	<u>Basalt</u> - Similar to above but not exhibiting a visible felty texture. Some zones highly brecciated and healed. Thin calcite on fractures. No blebs or amygdulites. No mineralization or alteration.
262.0	305.7	43.7	Drilled w/rock bit		<u>Basalt</u> - Character samples indicate it to be similar to above.
305.7	307.7	2.0	90	-	<u>Basalt</u> - Similar to above. Generally more broken, but not exhibiting as much healed brecciation. No mineralization or alteration.
307.7	330.0	22.3	Drilled w/rock bit		<u>Basalt</u> - Character samples indicate it to be similar to above.
330.0	334.2	4.2	98	-	<u>Basalt</u> - Similar to above. Basically dense, very fine-grained and hematite red. Blebs or amygdulites of calcite partially leached. Traces of chlorite and some oxidation of magnetite. Groundmass weakly mottled to brown. No mineralization or alteration.
334.2	342.2	8.0	95	-	<u>Basalt</u> - Similar to above. Color trends somewhat more toward purple when dry. Thin calcite and films of blue-gray manganese oxides(?) on fractures. No mineralization or alteration.

SUMMARY - DIAMOND DRILL HOLE NO. X-264
IX.25E 366.25N Collar Elevation 3205.9

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
342.2	352.2	10.0	99	-	Basalt - similar to above. Mottled from purplish hematite red to rust brown and exhibiting some zones of calcite blebs or amygdules. Few veinlets and scattered pods of quartz. Some breakage and healed brecciation in base of run. No mineralization or alteration.
352.2	359.4	7.2	100	-	Basalt - Similar to above. Some high angle veining of hematite and chabazite. Some zones exhibit a healed brecciation or replacement brecciation by hematite along these veins. Lower end of run broken and displaying some gouge. No mineralization or alteration.
359.4	361.7	2.3	13	-	Basalt and arkose - very poor recovery. Run consists of a few large fragments of a light gray to light tan, well indurated, medium grained arkose bearing only scattered grains of generally unoxidized magnetite. These fragments are followed by broken pieces of basalt and some gouge. No mineralization or alteration in either rock type. (Fragments of arkose probably came from boulder cored in overlying alluvium)
361.7	368.5	6.8	100	-	Basalt - similar to above. Displays some mottling throughout and localized zones of healed brecciation. Patches of blebs or amygdules of what are probably zeolites. No mineralization or alteration.
368.5	374.6	6.1	92	-	Basalt - similar to above in all respects. Somewhat more broken toward base of run. No mineralization or alteration observed.
374.6	384.8	10.2	100	-	Basalt - similar to above. Small flecks of chlorite, probable olivine, and hematite throughout. Scattered veinlets and fracture deposits of calcite. Core still magnetic. No mineralization or alteration observed.
384.8	389.9	5.1	94	-	Basalt - similar to above. A few brown, more oxidized zones crosscut the upper portion of the run. Lower portion exhibits patches of zeolite(?) amygdules which display peripheral zoning of chlorite and partial leaching. No mineralization or alteration observed.
389.9	400.0	10.1	100	-	Basalt - similar to above. Numerous zeolite amygdules and generally strong chlorite development. Partial leaching of these amygdules common. No mineralization or alteration observed.
400.0	409.7	9.7	90	-	Basalt - similar to above. Entire run exhibits generally strong, rehealed shearing along 50°± planes. No mineralization observed or alteration observed.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
409.7	416.2	6.5	100	-	<u>Basalt</u> - similar to above. Healed shearing common throughout. Fewer zeolite amygdules. Some mottling to rust brown. No mineralization or alteration observed.
416.2	424.0	7.8	86	-	<u>Basalt</u> - similar to above. Strong evidence of shearing and healing associated with some gouge. Some intercepts of small zeolite amygdules. No mineralization observed.
424.0	433.9	9.9	97	-	<u>Basalt</u> - similar to above. Amygdules are locally abundant, and a few clusters show a preferred vertical orientation. A few gougy slips are present. No alteration or mineralization observed.
433.9	443.9	10.0	95	-	<u>Basalt</u> - similar to above, to 443.6' and a fault contact with <u>Conglomerate</u> . The basalt is a black-brown color -- darker than above -- and contains amygdules filled with green prehnite or Celadonite. At 443.6, an 1/8" calcite-filled slip dips 74°. Below, is a red brown conglomerate with a maroon mudstone matrix. The fragments are rounded to angular, granule to large pebble size, and consist mainly of basalt. A few small fragments of arkose are present. The conglomerate is firmly indurated. Within 1 1/2" from the fault plane, the basalt is brecciated. No alteration or mineralization observed.
443.9	452.1	8.2	82	-	<u>Conglomerate and Post ore Fault Breccia</u> . A conglomerate identical to above continues to 444.4'. At this point the conglomerate grades abruptly into a poorly consolidated conglomerate containing granules to large pebbles of a biotite bearing rhyolite, arkose, and fine-grained basalt. The matrix is red brown sandy siltstone. With a decrease in pebble size and abundance, the conglomerate grades into red brown mudstone at 445.9'. This is very poorly consolidated. This unit extends to 447.4'. A 0.1' cobble of arkose occurs at the bottom. Below this, a fault zone begins. The fault zone is composed of thin to thick sheared layers of red mudstone-gouge, and of brecciated and sheared arkose and sulphides. The shear layers of mineralized rock appear as grey lenses containing ground up sulphides. Crushed sulphide occurs throughout the gouge-mudstone also. Small to large fragments of altered and pyritized arkose are disposed throughout. Gouge and breccia of altered rock and sulphide make up the bottom foot. Brecciated and crushed light gray argillite with diss. py underlie the fault, shear planes show variable dip, and range from 15-48°.
452.1	461.7	9.0	86	0.22	<u>Argillite</u> . Banded and mottled brown and buff or tan. Weakly calcareous. The rock is cut by numerous criss-crossing, curved fractures, and chloritic alteration is extensive along these structures. The first foot of rock is shattered or brecciated. Core throughout run is highly broken along the numerous fractures. Py is diss in fine grains, particularly near chloritic areas. Cpy is sparse. Cu content: sparse.

JK Log
 Norm Whaley

Summary - DDE No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
461.7	471.1	9.4	98	0.19	<u>Argillite</u> , similar to above. Calcareous throughout on seams and in the rock. Chloritic alteration prevalent. Cu content - sparse.
471.1	484.3	13.2	97	0.27	<u>Argillite</u> , similar to above to 372'± where it grades into a light brown argillite with less chloritic alteration. These two types are similar in many respects. Throughout this lower unit, are short intercepts of strong chloritic alt as above. Both types are calcareous. Py is the dominant sulphide, occurring as fine grains and thin stringers. Cpy is minor. Cu content sparse.
484.3	493.4	9.1	92	0.22	<u>Argillite</u> . The first few inches of core are pieces of highly talcose, fractured argillite. This initiates a very dense, black-brown argillite. This unit is cut by many chlorite-serpentine slips, but the alteration does not extend away from the slip surface. The last foot is a lighter colored argillite.
493.4	504.7	11.3	99	0.29	<u>Argillite</u> . Three types are present in this run. (1) 493.4-498.0'. Light grey argillite, fractured and kaolinized. Some feldspar(?) present as fine grains, gradational into (2) 498-501.6'. Dark brown sandy argillite. Numerous py stringers. Rock is weakly calcareous. This unit grades into (3) at 501.6' with an abrupt color change. (3) is light grey, weakly to strongly calcareous. Fine py-epy stringers with thin chloritic alteration halos cross the core in many directions. These veins are 1/8 to 1" apart. Cu content: sparse to weak.
504.7	516.4	11.7	98	0.20	<u>Argillite</u> . Similar to type (3) above, but with fewer veins of chlorite. At 512'± the rock changes to black chloritized argillite, core in this unit is broken into little pieces. At 513'± this unit grades into a light gray sandy argillite. Some clay alteration is present in the matrix. Py is diss. throughout run, more heavily in the black argillite, and also occurs in widely spaced 1/8" veins. Cu content sparse.
516.4	524.9	8.5	93	0.20	<u>Argillite</u> , similar to bottom unit of previous run. At 522.0' this grades into a mottled and banded buff, yellow, and brown, weakly calcareous argillite. Sulphides are diss in tiny grains. Mostly py. Cu content weak.
524.9	536.9	12.0	77	0.26	<u>Argillite</u> , similar to last unit of previous run. Suggestion of 45°± dip. At 528.9 is a chloritic shear zone 0.3(+) thick and dips 10°. The rock below is heavily kaolinized for a distance of 1.0'. Crushed core and kaolinized material at 532.5' suggest another fault. Rock below the fault zone is light green argillite, somewhat similar to the rock above the fault, and is cut by numerous chlorite veinlets. Py is diss. Cu content - sparse or weak.
536.9	547.3	10.4	55	0.24	<u>Argillite</u> , similar to above to 544'±. Below a gradational contact is a light gray fine-grained <u>arkose</u> . Calcite filled shears dip 15° at 544.0'. Cu content sparse or weak.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
547.3	557.5	10.2	94	0.21	<u>Arkose</u> , similar to above. Core badly broken. Cu content sparse.
557.5	568.4	10.9	83	0.24	<u>Arkose</u> , similar to above. Rock highly fractured and altered to serpentine. Core broken to little pieces. Slight increase in sulphides. Mostly py. Cu content sparse.
568.4	578.1	9.7	93	0.24	<u>Arkose</u> , similar to above, for 0.5'. Below this is a strongly fractured and healed arkose, with numerous chloritic zones and gougy slips. Core very badly broken. This crushed unit extends to 574.3', where a 50° gouge zone forms a contact with <u>Argillite</u> . This rock is weakly calcareous, and varies in color from tan to various shades of gray-green. Some black areas may represent the original color. Sulphides are diss weakly in the arkose, and a few 1/8" veins are present. In the argillite, numerous thin veins are present, as well as diss blebs. Sulphides mostly py, sparse cpy. Cu content sparse.
578.1	591.6	13.5	96	0.15	<u>Argillite</u> , similar to lower portion of previous run, extends to 582'±. Here a gradational contact initiates a gray-brown, very sandy argillite. In the latter rock, py is moderately diss in small cubes. Cu content sparse.
591.6	602.8	11.2	98	0.09	<u>Sandy argillite</u> , similar to lower portion of previous run. Cu content sparse.
602.8	611.0	8.2	88	0.21	<u>Sandy Argillite and Arkose</u> . Similar to above. Occur in an alternating, gradational sequence which ranges in color from light gray to dark greenish gray. Generally altered, sericitic, and very highly broken and fractured. The slips and fractures are 80-90° and display thin gyp, chlorite, and black gouge. Bleaching along veinlets, pseudo-granular textures created by sericite, traces of epidotization, and weak feldspar development common. Veinlets and diss of py and some cpy. Traces of sphalerite and moly. Cu content rare to sparse.
611.0	623.7	12.7	61	0.21	<u>Sandy Argillite and Arkose</u> . Similar to above. Still highly broken and fractured. Some increase in py. Traces of sphalerite. Cu content rare to sparse.
623.7	635.9	12.2	94	0.25	<u>Sandy Argillite and Arkose</u> . Similar to above. Exhibits greater crushing and a fair percentage of diss hm and chlorite or serpentine. One intercept displays dark streaking which dips 60-70°. Py and some cpy in diss and veins. Traces of sphalerite. Cu content sparse.
635.9	645.9	10.0	93	0.21	<u>Sandy Argillite and arkose</u> . Similar to above. Below 641' core is much less broken. Same mineral assemblage and traces of moly. Cu content rare to sparse.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
645.9	657.9	12.0	97	0.15	<u>Sandy Argillite and Arkose. Similar to above but much less broken. Around 647' rock grades more toward the lighter gray arkosic phase and remains so throughout the run, exhibiting only patches of the dark argillite. Py disseminated throughout and occurring in abundance with black gouge on 60-70° slips and fractures. Traces of molybdenite. Cu content rare to sparse.</u>
657.9	666.8	8.9	98	0.12	<u>Sandy argillite, similar to above. Light grey phase and appears to be altered from a black to grey phase. A post-ore breccia(?) and post-ore thin black gouge dip 65-80° (principal dip 65°) at 658.5'. The gray arg is cut by many thin white alteration bands. Diss sulphides - moderate - are py with some cpy. Traces MoS₂. Cu content weak.</u>
666.8	679.3	12.5	68	0.18	<u>Sandy argillite, similar to above, to 669'±. Here a black sandy arg with 2-3 mm rock fragments is highly broken by steep, but irregular chloritic fault planes. Below 674' rock is similar to that at beginning of run. Py is moderately diss in fine grains, as well as in small veins. Cpy is in lesser abundance. Cu content weak to moderate.</u>
679.3	685.4	6.1	97	0.14	<u>Sandy argillite, somewhat similar to above. Alteration has produced a white colored rock with small angular patches -- remaining between crossing veins of alteration -- which are gray. Py and cpy occur in diss and veins. At 683' is a vein of cpy-sphalerite(?). Cu content - weak or moderate.</u>
685.4	695.4	10.0	97	0.26	<u>Sandy argillite, similar to above, grading down into gray white fine-grained arkose. Weak clay and sericite alt. Arkose is weakly calcareous. Sulphides fairly strong, principally diss but also as veinlets. Py is dominant with lesser cpy. Numerous high-angle post-ore slips are present.</u>
695.4	704.2	8.8	98	0.20	<u>Arkose, similar to above, to 692.0' where it changes abruptly to dark gray argillite, which locally contains thin bands composed of light colored parallel, generally straight but in places contoured, silt(?) bands. This stratification(?) dips about 70°. Toward the end of the run the rock gradually changes to a light colored to medium gray sandy argillite. Py and some cpy are diss and in veins. Numerous post-ore slips are shown by surfaces of greasy black chloritic gg. with crushed sulphides. Cu content weak.</u>
704.2	714.3	10.1	100	0.11	<u>Very sandy argillite and fine-grained arkose. Light gray to brown. Py diss in fine grains. A few thin veins. Cpy minor. Trace MoS₂. Cu content weak.</u>
714.3	720.5	6.2	100	0.16	<u>Sandy argillite, gradational with above, is light gray to buff. Sulphides similar to above. Cu content weak.</u>

- 720.5 728.1 7.6 96 0.16 Argillite and sandy argillite. Gray, similar to above to 722', brown to 724', and gray with slight greenish cast to bottom of run. Py and cpy diss. Core is cut by many post-ore slips, irregular and curving. Clay-sericite is strong. Cu content sparse.
- 728.1 737.7 9.6 94 0.15 Argillite, similar to above. Large portions of core are brown-black, altered to a mottled tan with faint greenish cast. Weakly calcareous. Rock is soft and breaks hackly fracture surfaces which show serpentine. Bedding lamination at 733' dips 60°. Py diss weakly and on a few veins. Cu content sparse.
- 737.7 747.4 9.7 95 0.19 Argillite, similar to above. Sulphides slightly heavier. Cpy more abundant.
Cu content - weak.
- 747.4 760.6 13.2 96 0.18 Sandy argillite or fine-grained arkose. Grain size is transitional between these two types. Rock is gray with local areas which show a red tinge. Tiny flecks of chlorite are abundant, and epidote is rare. Occasional serpentine slip. Sulphides are diss throughout in tiny grains and seams. Py predominates; cpy also present. Cu content weak to moderate.
- 760.6 770.6 10.0 97 0.12 Sandy argillite. Gray, similar to above to 767.3', where a short zone of crushed rock and moderate kaol. initiate a brown sandy argillite. This unit becomes brown-gray near bottom of run. Py is the principal sulphide, diss in fine-grains and occurring in thin veins. Some veins of py-gypsum are present near top of run. Cpy minor. Cu content sparse.
- 770.6 778.1 7.5 96 0.19 Argillite. This unit begins at start of run. The texture is locally sandy, and the colors are mottled gray and buff, forming irregular contacts with black argillite. From 772.4-773.1, the rock shows very thin laminated bands of tan to buff colors -- probably bedding. These dip 47-50°. Py diss throughout, with some cpy. Thin veins of sulphide are numerous. Serpentine on slips. Cu content weak.
- 778.1 790.7 12.6 98 0.24 Argillite, similar to above in all respects. Epidote and chlorite occur in clusters. Cu content weak.
- 790.7 803.0 12.3 100 0.25 Argillite and sandy argillite, similar to above. Black colored phase absent.
Cu content sparse.
- 803.0 813.2 10.3 88 0.18 Argillite and sandy argillite, similar to above. Gray color predominates, and shows abundant feldspathic spots (textile?). Sulphides weaker than above. Cu content sparse.
- 813.2 824.5 11.3 91 0.13 Argillite and sandy argillite. Similar to above to 816.6' where it changes along a tight, irregular, and slightly gradational contact to brown sandy argillite criss-crossed by numerous veins of sulphide and surrounding halos of bleached rock. At 819.2' is a banded zone which may be bedding laminations dips 40°. At 822.2 this brown unit is in tight contact with gray green argillite similar to that at beginning of run. Py diss. Cu content sparse.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
824.5	828.9	4.4	91	0.16	Post Ore Fault Zone. Zones of gouge and Bx, with .3-.8' fragments of silicified arg or ark. Crushed sulphides throughout the gouge. An abundance of sulphide (mostly py) suggests that this may be also a pre-mineral structure. Shear planes are not well developed, but appear to dip at low angles; from 0 to 20°. Rock frags are kaolinized. Cu content sparse.
828.9	839.4	10.5	97	0.14	Arkose(?). Brown colored siliceous rock with numerous small sub to anhedral feldspar grains. Color may be due to finely diss biotite. Qtz veins with py traverse rock, and are bordered by bleached areas. In the lower part of this run are some short intercepts of gray argillite. Py is the dominant sulphide. MoS ₂ occurs in traces throughout run. Cu content sparse. Special assay - Mo: 0.034%.
839.4	852.3	12.9	95	0.17	Arkose(?) and argillite. Arkose, similar to above, and also gray without biotite(?). These rocks are interbedded with brown and gray argillite. Bedding lamination in the argillite dips 25-35°. Veins of Py-MoS ₂ -gyp. Diss py and Mo. Feldspathic gouge and hematite form the bottom 0.3'. Cu content sparse. Special Mo assay: 0.016%.
852.3	863.3	11.0	97	0.14	Fault zone, to 852.9', consisting of breccia fragments and thick bands of gypsum; dip 60°. Sulphides in this zone do not appear crushed, and are banded in thin seams along fault. Light gray arkosic argillite to 854.3', and a 40° thin slip. Below this is brown (diss biotite?) arkose(?) similar to that of previous run. Wide silicified zones border py veinlets. This unit extends to 859.1' and a 38° thin slip, with shattered zone 0.1' above slip. Below is a brown completely dense argillite. Hard, conchoidal fracture. Bedding laminations below slip are variable low-angle, truncated by slip. This unit grades abruptly into brown slightly sandy argillite at 860.1'. This grades at 862.8' into light brown argillite. At 860.6 is a qtz-py vein dipping 75°. Silicified zone 1" each side. Py dominant in all rock types. Cu content sparse.
863.3	871.6	8.3	94	0.12	Argillite and sandy argillite. Similar to types above. Considerable biotite(?) development. Siliceous veins of py. Cu content sparse.
871.6	881.0	8.8	99	0.07	Sandy argillite. Brown, with abundant finely diss biotite(?). Numerous serp. fractures. Py in veins and diss. tr. cpy. Gouge and slips at 878.0'. Cu content sparse.
881.0	883.6	2.6	100	0.54	Transition zone -- argillite and tactite. The argillite is light brown, soft, and contains white feldspathic(?) spots. This rock is intergrown with yellow green garnet and chlorite. Py is diss, and occurs in thick veins. Pre-and post-pyrite shears dip about 50°. Trace of specularite. Cu content weak.
883.6	894.2	9.0	86	0.17	Diopside hornfels and tactite. The hornfels begins the run with a gradational

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
<p>contact from transition zone above, and extends to a sharp, flat contact at 886.0'. This rock is composed of soft gray granular diopside, and is traversed by py veins with borders of blue-black actinolite. The tactite is a very soft rock composed of 50% yellow garnet and 50% very soft diopside. A few hematite veinlets are present. From 889.7-890.5' is an intercept of diop. Hf. similar to first part of run; contacts tight, dip about 15-20°. Tactite contains weakly diss py. Cu content sparse.</p>					
894.2	904.9	10.7	92	0.21	<u>Tactite</u> , similar to that in previous run. Yellow brown garnet. Diopside content 20% to 50%. Py with some cpy occurs in a few spots as small pods. Core ground up the 0.21. Cu content weak.
904.9	911.5	6.6	93	0.06	<u>Marble</u> . Contact at beginning of run is broken. Chlorite and gouge fragments. Below this is 0.6' black moderately calcareous mudstone with py seams. This is in sharp contact with white fine-grained marble. Between 909.4 and 911.0' is an intercept of yellow gray mudstone. Core broken to little pieces. Marble is cut by hairline serpentine-py veins. Cu content sparse.
911.5	922.3	10.8	75	0.19	<u>Tactite and Marble</u> . The first is yellow and massive; begins run and extends to 912.4'. Below is a white marble, similar to above. Below 914.0' is 1 ft. of serpentine and py. Below this is white silicated limestone, or dolomite. Between 919-920' is gouge of white granular material, and micaceous plates. Normal white marble occurs below 921'. Cu content sparse.
922.3	927.0	5.7	91	0.95	<u>Hornfels and Tactite</u> . Diopside hornfels initiates run. Black serpentine zone of gouge on contact. This continues to 923' where gyp vein forms contact with tactite. This unit contains yellow garnet and soft diopside. 0.3' shear zone at bottom of run dips 20°, and forms contact with next unit. Cu content sparse.
927.0	942.1	15.1	95	0.02	<u>Limestone</u> , gray, fine-grained. Calcite seams throughout. A lination dipping 40° is persistent throughout run, formed by oriented calcite streaks. Some clots and small bits of calcite suggest parts of fossils, but none are preserved well enough for any identification. Py weak -- occasional grain and thin seam.
942.1	955.5	13.4	100	0.02	<u>Gray limestone</u> , similar to above, to 950.3', where a 40° slip forms contact with mottled limestone. The first unit shows pronounced planar structure dipping 50-60°; the calcite planes are locally pygmatically folded. The movement of flowage suggested by these folds is up the dip of the planes. The mottled limestone is gray, slightly dolomitic, with large interlocking veins and blebs of calcite. Both units contain widely diss py. Cu content sparse.
955.5	962.4	6.9	100	0.01	<u>Mottled limestone</u> , gray and white, similar to above. Round white spots surround a tiny core of py(?). 61.7-62.1' is a low-angle Bx zone and soft black gouge. Scattered calcite casts of pelecypods(?). Cu content nil.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
962.4	972.7	10.3	84	0.03	<u>Marble</u> , dolomitic; white, fine grained serpentine veinlets. 20° gouge at 962.8'. Cu content nil.
972.7	981.2	8.5	97	0.07	<u>Marble</u> , white, similar to above, to 976.1'. Here a 45° serp. slip and diss MoS ₂ initiates a mixed zone of gray marble and white coarse marble. Slightly vuggy and hematite stained. Cu content nil.
981.2	995.2	14.0	98	0.02	<u>Marble</u> , similar to last part of above run. White predominates, mixed with areas of gray marble. Some calcite forms suggest poorly preserved fossils. Sul- phides not seen. At 992' is a knot of gray chert. Cu content nil.
995.2	1009.2	14.0	97	0.02	<u>Cherty marble</u> to 1003'. White to gray marble with small knots of gray black chert, comprising 20% of rock; one 3/4 foot intercept is 60% chert. Below 1003' is gray marble with white blebs and streaks. Small white spheres center about tiny cores of py(?) alt. to limonite. Cu content nil.
1009.2	1015.9	6.7	100	0.02	<u>Gray marble</u> , similar to last part of above. Highly fossiliferous, with 1/4-3/4" casts of shells, and other smaller fossil fragments. None appear well enough preserved to identify. Trace of py. Cu content nil.
1015.9	1026.0	10.1	100	0.02	<u>Gray marble and white marble</u> . The first, similar to above, is highly fossilifi- ferous, containing casts of shells and unidentified fragments. Small spheres of white marble center about py cores. The last foot is made of white marble. Cu content nil.
1026.0	1035.4	9.4	99	0.20	<u>Marble</u> , white, similar above, extends to 1028'. At this point the marble gives way through a crushed zone to fine white gouge, which marks a <u>fault zone</u> extending to 1032.1'. This zone consists of gouge and bx, with a few short intercepts of hornfels. Bx filling is both massive red hematite, and chlorite. The white gouge intercepts are not effervescent, and may be ground diopside. Below 1032.1' is dense cream colored hornfels (diop?). The last 1/2' is green tactite. No sulphides seen. Some weak hem. stain is present in last unit. Cu content nil.
1035.4	1044.7	9.3	87	0.01	<u>Tactite and hornfels</u> . Tactite is the principal type, and contains shorter intercepts of diop(?) hornfels. Considerable diop(?) is mixed with the tactite units. A 0.4' <u>fault zone</u> occurs below 1042.3', and consists of banded hematite and gg-bx, dipping 15°. Faint hematite staining. No sulphides seen. Cu content nil.
1044.7	1056.3	11.6	97	0.01	<u>Tactite, hornfels and argillite</u> . The tactite is yellow green andradite (high(+) relief, 1.78 oil), and is interbedded below 1049.4' with coarse, fibrous wollastonite hornfels. Garnet layers and other color bands dip 40-50°. Argillite

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
dark brown with faint red tinge, occurs between 1047.1' and 1049.4'. Upper cut 55° hem. slip. Lower cut 55° tight. No sulphides seen. Cu content nil.					
1056.3	1066.5	10.2	37	0.02	<u>Tactite</u> , similar to above; garnet and wollastonite intergrown. Fault, 1" zone bx, gouge, hem., dips 35° at 1060'±. Trace py alt to limonite. Cu content nil.
1066.5	1081.7	15.2	93	0.07	<u>Tactite and argillite</u> . Tactite is similar to above, extends to an obscure contact at 1074.3' with <u>argillite</u> . This is somewhat mottled, pale gray, greenish, and tan, may be slightly silicated. Vein, 1/4", of galena, calcite, minor cpy, occurs at 1073.0, dips 45°. At 1080 is a patch of limonite after py, and leached sulphide cavities. A few hem-filled slips dip 45° more or less. No sulphides except as noted. Cu content nil.
1081.7	1091.6	9.9	97	0.01	<u>Argillite</u> , similar to above, altered locally to tactite. Fault zone, 0.1' at 1082.7, dips 32°, consists of banded hem, gouge. In lower half of run tactite-argillite are in contact along steep faults. Cu content nil.
1091.6	1105.9	14.3	88	0.02	<u>Tactite</u> , yellow garnet, with some admixed soft material (diop?). Diss hematite. A few hard hornfelsic patches. Fault zone, 1093.1-1093.6', consists of hematite and white gouge, dips 15-40°. At end of run is hem gouge and ground up core. Cu content nil.
1105.9	1116.0	10.1	95	0.04	<u>Tactite and shear zone</u> . Tactite continues similar to above to 1109.2'. At this point a calcite-chlorite vein dips 70°; the tactite above is weakly chloritized a distance of 0.7'. Below is a chloritized tactite with weakly diss py and cpy in fine grains. Streaks of feldspathic material are present. This unit may be garnetized argillite. At 1111.7' the <u>shear zone</u> of the basement fault is initiated by 2" of brown gouge which dips 18°. The shear zone contains small to large irregular frags of crushed arkose of gray and reddish colors. These frags are packed together with tight contacts outlined by thin chlorite seams. No direction of shearing is shown. No sulphides visible. Cu content nil.
1116.0	1133.8	17.8	100	0.02	<u>Shear zone</u> , similar to above. The rocks within it are dark red siltstone, med. gr. gray green arkose, brown arg. These occur in intercepts up to 3' long, and are separated by tight chloritic contacts, and locally by low angle shears with augen structure. A few areas contain diss ly. Cu content nil.
1133.8	1143.6	9.8	93	0.04	<u>Shear zone</u> . Consisting of brown arg. cut by numerous red siltstone, shear planes of irregular and various dips. This type continues to 1138.1'. Below is red siltstone cut by irregular serpentine slips, with tiny irregular calcite seams. High-angle gypsum veins present. Cu content nil.

Summary - DDH No. X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
1143.6	1153.4	9.8	92	0.01	<p><u>Shear zone and granite.</u> Shear zone consists of 2 units. The upper is red siltstone similar to above, cut by parallel system of calcite veins dipping 20-30°. One gypsum vein present, some slippage and Bx associated with the calcite seams. This unit extends to 1145.4', and a bx contact with a laminated mylonite (hardness 4). The laminations are hairline to 1/8", and are marked by contrasting colors, ranging from dark purple through light purple, and also gray brown of various shades. Has the appearance of a thinly bedded siltstone or shale. A few laminations show Bx, and some contain augen structure. Dips begin at 30° and slowly flatten to 20° 1/8 - 1/4" gypsum vein parallel laminar structure. The last 2.1' of the shear zone, from 1150.5-1152.6', is a serpentine shear area with breccia fragments. At 1152.6', a gray shear forms the contact with crushed granitic rock. Light gray, stained yellow, coarse grained qtz-feld. No alteration is present in the granite. Cu content nil.</p>
1153.4	1163.2	9.8	100	0.02	<p><u>Sierrita granite.</u> Coarse grained qtz and feld., with bleached biotite, locally altered to chlorite. Crushing decreases toward end of run. No alt or mineralization seen. Cu content nil.</p>
1163.2	1178.3	15.1	99	0.02	<p><u>Sierrita granite, similar to above.</u> Some biotite black, while others are bleached or alt to chlorite, local shearing and augen structure developed. No alteration or mineralization seen. Cu content nil.</p>

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE X-264
Started: 4-11-59 Completed: 6-8-59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	214.7	214.7	-	-	-	No Sludge
214.7	217.0	2.3	-	-	-	-
217.0	260.0	43.0	-	-	-	-
260.0	262.0	2.0	-	-	-	-
262.0	305.7	43.7	-	-	-	-
305.7	307.7	2.0	-	-	-	-
307.7	330.0	22.3	-	-	-	-
330.0	334.2	4.2	-	-	-	-
334.2	342.2	8.0	-	-	-	-
342.2	352.2	10.0	-	-	-	-
352.2	359.4	7.2	-	-	-	-
359.4	361.7	2.3	-	-	-	-
361.7	368.5	6.8	-	-	-	-
368.5	374.6	6.1	-	-	-	-
374.6	384.8	10.2	-	-	-	-
384.8	389.9	5.1	-	-	-	-
389.9	400.0	10.1	-	-	-	-
400.0	409.7	9.7	-	-	-	-
409.7	416.2	6.5	-	-	-	-
416.2	424.0	7.8	86.3	-	-	-
424.0	433.9	9.9	97.1	-	-	-
433.9	443.9	10.0	95.3	-	-	-
443.9	452.1	8.2	-	-	-	-
452.1	461.7	9.6	85.9	-	0.22	-
461.7	471.1	9.4	97.5	-	0.19	-
471.1	484.3	13.2	96.8	-	0.27	-
484.3	493.4	9.1	92.4	-	0.22	-
493.4	504.7	11.3	99.2	-	0.29	-
504.7	516.4	11.7	97.9	-	0.20	-
516.4	524.9	8.5	92.8	-	0.20	-
524.9	536.9	12.0	77.1	-	0.26	-
536.9	547.3	10.4	54.7	-	0.24	-
547.3	557.5	10.2	93.5	-	0.21	-
557.5	568.4	10.9	82.9	-	0.24	-
568.4	578.1	9.7	93.3	-	0.24	-
578.1	591.6	13.5	96.5	-	0.15	-
591.6	602.8	11.2	97.6	-	0.09	-
602.8	611.0	8.2	87.7	-	0.21	-
611.0	623.7	12.7	60.7	-	0.21	-
623.7	635.9	12.2	93.7	-	0.25	-
635.9	645.9	10.0	92.9	-	0.21	-
645.9	657.9	12.0	96.6	-	0.15	-
657.9	666.8	8.9	98.0	-	0.12	-
666.8	679.3	12.5	68.0	-	0.18	-
679.3	685.4	6.1	96.9	-	0.14	-
685.4	695.4	10.0	97.4	-	0.26	-

ASSAY DATA - DDH X-264 - Continued

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
695.4	704.2	8.8	97.8	-	0.20	No-Sludge
704.2	714.3	10.1	101.1	-	0.11	-
714.3	720.5	6.2	101.8	-	0.16	-
720.5	728.1	7.6	96.3	-	0.16	-
728.1	737.7	9.6	93.6	-	0.15	-
737.7	747.4	9.7	95.3	-	0.19	-
747.4	760.6	13.2	96.0	-	0.18	-
760.6	770.6	10.0	97.2	-	0.12	-
770.6	778.1	7.5	96.0	-	0.19	-
778.1	790.7	12.6	97.5	-	0.24	-
790.7	803.0	12.3	100.0	-	0.25	-
803.0	813.2	10.2	87.5	-	0.18	-
813.2	824.5	11.3	91.3	-	0.13	-
824.5	828.9	4.4	90.7	-	0.16	-
828.9	839.4	10.5	96.5	-	0.14	-
839.4	852.3	12.9	95.2	-	0.17	-
852.3	863.3	11.0	97.0	-	0.14	-
863.3	871.6	8.3	94.3	-	0.12	-
871.6	881.0	9.4	99.3	-	0.07	-
881.0	883.6	2.6	103.2	-	0.54	-
883.6	894.2	10.6	86.4	-	0.17	-
894.2	904.9	10.7	92.3	-	0.21	-
904.9	911.5	6.6	92.5	-	0.06	-
911.5	922.3	10.8	75.0	-	0.19	-
922.3	927.0	4.7	90.5	-	0.95	-
927.0	942.1	15.1	94.9	-	0.02	-
942.1	955.5	13.4	99.7	-	0.02	-
955.5	962.4	6.9	102.0	-	0.01	-
962.4	972.7	10.3	83.8	-	0.03	-
972.7	981.2	8.5	96.5	-	0.07	-
981.2	995.2	14.0	97.8	-	0.02	-
995.2	1009.2	14.0	97.1	-	0.02	-
1009.2	1015.9	6.7	100.4	-	0.02	-
1015.9	1026.0	10.1	103.2	-	0.02	-
1026.0	1035.4	9.4	99.2	-	0.20	-
1035.4	1044.7	9.3	86.5	-	0.01	-
1044.7	1056.3	11.6	96.8	-	0.01	-
1056.3	1066.5	10.2	37.3	-	0.02	-
1066.5	1081.7	15.2	92.5	-	0.07	-
1081.7	1091.6	9.9	97.4	-	0.01	-
1091.6	1105.9	14.3	88.0	-	0.02	-
1105.9	1116.0	10.1	95.2	-	0.04	-
1116.0	1133.8	17.8	100.0	-	0.02	-
1133.8	1143.6	9.8	92.6	-	0.04	-
1143.6	1153.4	9.8	91.6	-	0.01	-
1153.4	1163.2	9.8	100.8	-	0.02	-
1163.2	1178.3	15.1	98.7	-	0.02	-

Bottom

Kinnison

SUMMARY - DIAMOND DRILL HOLE NO. 234
2425N 6950W Collar Elevation 3323±

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	221.6	221.6	-	-	<u>Alluvium.</u> Rockbit.
221.6	227.0	5.4	30	0.10	<u>Metaporphry.</u> Bedrock just above begin- ning of run at about 220'. Rock is almost entirely retextillized, and no porphyry texture remains. Buff color, coarse- grained qtz-feld intergrowth. No biotite. Oxidized, with weak yellow limonite. Mn oxides coat fractures. Cu content - sparse.
227.0	232.4	5.4	24	0.06	<u>Metaporphry,</u> similar to above. Qtz veining prominent. Trace "live limonite". Cu content - sparse.
232.4	242.6	10.2	6	0.07	<u>Metaporphry,</u> similar to above. Several thin oxidized qtz veins with py-limonite. Cu content - sparse.
242.6	249.7	7.1	20	0.22	<u>Metaporphry,</u> similar to above. To 245.2, 0.4' core recovered, all sulphide. Base of oxid. must occur between 242.6 and 249.3'. Py is diss and also in thin stringers. Some chlorite associated with the py. Cpy present. Cc is weak to heavy, replacing py. Cu content - moderate.
249.7	255.2	5.5	87	0.17	<u>Metaporphry,</u> similar to above. Py, cpy, and Cc. A few sulphide stylolites are present. Cu content - weak to moderate.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE 234

Date Started: 8/1/59

Date Completed: 8/6/59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	221.6	221.6	-	-	-	-
221.6	227.0	5.4	-	-	0.10	-
227.0	232.4	5.4	-	-	0.06	-
232.4	242.6	10.2	-	-	0.07	-
242.6	249.7	7.1	-	-	0.22	-
249.7	255.2	5.5	-	-	0.17	-

Bottom

SUMMARY - DIAMOND DRILL HOLE NO. 235 +
3750N 5000W Collar Elevation 3264.5-

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	170.0	170.0	-	-	<u>Rockbit</u> , Alluvium.

Bedrock not reached.

SUMMARY - DIAMOND DRILL HOLE NO. 236
4950N 5250W Collar Elevation 3255.5⁺

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	198.0	198.0	-	-	<u>Rockbit.</u>
198.0	203.0	5.0	44	-	<u>Caliche conglomerate. Frags of alt. arkose and argillite.</u>

B o t t o m

SUMMARY - DIAMOND DRILL HOLE NO. 237
5850N 3550E Collar Elevation 3066±

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	243.7	243.7	-	-	Rockbit. Bedrock at 242'±.
243.7	245.0	1.3	77	0.02	Arkose, gray coarse-grained. Weak limonite stain, after py(?). Cu - nil.
245.0	252.9	7.9	92	0.01	Arkose, similar to above to 246.8'. Here it grades into a green fine-grained arkose or very sandy argillite. Very spotty lim. stain. Cu content - nil.
252.9	262.4	9.5	91	0.01	Siltstone, green similar to lower part of preceding run. Faint red tinge to 255'. Contains small rounded clots which may be concretions or possibly shale fragments. A few resemble fossil forms. Bedding is 70°. Below 258' grades into olive green sandstone, fine-grained. No alt or mineralization present.
262.4	276.3	13.9	92	0.01	Siltstone, olive green soft similar to that in preceding run. Massive except for local laminated zones dipping 62-72°. Unmineralized.
276.3	287.8	11.5	99	0.03	Siltstone, sandy olive green. Calcareous. This grades into black calcareous siltstone at 285.0'-285.3'. The change is one of color only. Laminated bedding dips 60-70°. Most of unit is massive. Unmineralized.
287.8	296.9	9.1	98	0.02	Siltstone, black, calcareous. Very fine irregular laminations dip 70°. Numerous frags. of black siltstone. Unmineralized.
296.9	306.3	9.4	98	0.01	Siltstone, similar to above, massive.
306.3	316.4	10.1	91	0.01	Siltstone, similar to above, alternating with limestone in 1/4" to 1" bands. The limestone is white, made of coarse calcite grains, in a grey, silty matrix. Dips are wavy and vary from 60-90°.
316.4	328.3	11.9	97	0.01	Siltstone and arkose. The siltstone is similar to above at beginning of run, and grades into an olive green calcareous siltstone at about 317.5'. The olive green type continues to a 65° sedimentary contact at 318' with a gray medium- to coarse-grained arkose. Stratification dips 70°. Some of the stratified lenses are colored a pale green. Limonite specks and dendrites are prevalent throughout, but no evidence of original sulphides is present. The iron staining probably derives from mafic constituents of the arkose. Gouge zone at end of run.
328.3	341.8	13.5	98	0.02	Sandy siltstone and arkose. The former is olive green, hard, locally calcareous.

(continued next page)

SUMMARY - D. D. HOLE 237 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
Faint laminations dip 75°. Limonite sparse on fractures. At 340.4 it grades into a laminated fine-grained gray arkose, dipping 60°. A small cube of py is present near end of run.					
341.8	351.3	9.5	97	0.03	<u>Arkose and siltstone.</u> The former is similar to above, finely laminated, dipping uniformly 55°. This extends to a 60° sedimentary contact at 344.0' with siltstone, locally calcareous, dark gray to olive gray. This unit is semi-massive, but a few bedding contacts are present, and dip about 65-70°. Unmineralized.
351.3	361.2	9.9	97	0.01	<u>Siltstone, arkose and siltstone.</u> The run begins in hard sandy siltstone and grades downward into medium-grained arkose -- these rocks being similar to those above. At 354.1' a 60° sedimentary contact initiates black calcareous siltstone. Massive, with a few frags. of black siltstone.
361.2	370.7	9.5	99	0.01	<u>Siltstone, black to gray, similar to above.</u> Calcareous. From 364.4-365.7 is gray coarsely crystalline silty limestone. Upper contact dips 60°. Lower contact irreg. Local laminations in the siltstone dip 60°.
370.7	380.6	9.9	99	0.02	<u>Siltstone, similar to above.</u> Massive. Unmineralized.
380.6	390.2	9.6	97	0.01	<u>Siltstone, grey, calcareous and massive,</u> similar to above. Below 388 becomes sandy and has faint olive tinge.
390.2	400.7	10.5	100	0.01	<u>Arkose.</u> Gray, fine-grained. Faint olive tinge. Calcareous. Gradational with bottom part of preceding run. Massive. At 392' is a 3" zone with 1/8" py cubes; the enclosing rock is unaltered.
400.7	410.7	10.0	99	Tr	<u>Arkose and siltstone.</u> The arkose is similar to above, and extends to 201.4'. Here a 66° 1/4" calcite seam initiates a black to gray calcareous, massive siltstone, containing small frags of black siltstone. No alteration or mineralization.
410.7	424.3	13.6	94	0.02	<u>Siltstone and arkose.</u> The siltstone is similar to above. Between 421.3' and 422.5' is a soft white medium-grained arkose with thin stringers of black siltstone dipping 40°, and which give a banded appearance. The arkose is calcareous, and is traversed by calcite seams. The bottom contact dips 65°.
424.3	437.3	13.0	95	0.01	<u>Siltstone and arkose.</u> The siltstone is similar to above, but is closely laminated to thin-bedded in contrast to the massive character above. Some of the

SUMMARY - D. D. HOLE 237 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core</u> <u>Rec.%</u>	<u>% Cu</u> <u>Core</u>	<u>Geology</u>
beds are exceedingly sandy. The bottom contact is at 428.4'; the siltstone above for 1' being strongly broken, and cut by calcite veins at about 427.5'. Below this broken zone is a grey white fine-to coarse-grained arkose. Dips of stratification are 60°. Some thin calcite seams are present, but the rock itself is non-calcareous. No alt. or mineralization.					
437.3	450.0	12.7	92	0.04	Arkose, similar to above, but all fine-grained. Stratification dips 60°. No alt. or mineralization.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE NO. 237
Started: 8/11/59 Completed 8/24/59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	236.0	236.0	Rockbit			
236.0	243.7	7.7	Rockbit			
243.7	245.0	1.3	77.0	None	0.02	None
245.0	252.9	7.9	91.8	-	0.01	-
252.9	262.4	9.5	91.3	-	0.01	-
262.4	276.3	13.9	91.5	-	0.01	-
276.3	287.8	11.5	99.4	-	0.03	-
287.8	296.9	9.1	98.1	-	0.02	-
296.9	306.3	9.4	97.5	-	0.01	-
306.3	316.4	10.1	91.3	-	0.01	-
316.4	328.3	11.9	96.8	-	0.01	-
328.3	341.8	13.5	97.5	-	0.02	-
341.8	351.3	9.5	97.1	-	0.03	-
351.3	361.2	9.9	97.0	-	0.01	-
361.2	370.7	9.5	99.3	-	0.01	-
370.7	380.6	9.9	98.9	-	0.02	-
380.6	390.2	9.6	97.4	-	0.01	-
390.2	400.7	10.5	99.8	-	0.01	-
400.7	410.7	10.0	99.0	-	Trace	-
410.7	424.3	13.6	94.5	-	0.02	-
424.3	437.3	13.0	94.6	-	0.01	-
437.3	450.0	12.7	92.0	-	0.04	-

Bottom

SUMMARY - DIAMOND DRILL HOLE NO. 238
2400N 3500E Collar Elevation 3115 ±

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	221.0	221.0	-	-	Rockbit. Bedrock at 217 ² .
221.0	224.3	3.3	30	0.02	Arkose, gray, fine-grained, calcareous. Psuedomorphs of limonite after py diss. Cu content - nil.
224.3	236.5	12.2	84	0.02	Arkose and siltstone. The arkose is similar to above, with a small quantity of limonite on fractures and occasional diss. after py(?). A 1" zone of olive arkose, dipping 85°, initiates olive gray calcareous siltstone at 234.6'. Weak limonite on fractures in the siltstone. No alt. is present.
236.5	250.6	14.1	81	0.01	Siltstone, similar to above. The last 2' is very talcose and soft, non-calcareous. Core ground up. Trace of limonite films. Entirely massive.
250.6	260.5	9.9	91	0.02	Siltstone and arkose. The siltstone is similar to above. It contacts arkose below at 253.7', along an 80° bedding zone. The arkose is fine-grained, olive-gray, weakly calcareous. Massive just below the contact, it becomes well stratified about 254.4'. The dip is about 80°, but in places is as low as 58°.
260.5	275.0	14.5	97	0.02	Arkose and siltstone. The arkose is banded similar to above, dipping 70°. This unit contacts gray calcareous siltstone, massive, at 266'. A thin, laminated zone dips 70°.
275.0	286.7	11.7	96	0.01	Siltstone and arkose. Siltstone, similar to above, contacts greenish fine-gr. arkose at 276', and this passes back into siltstone at 284.0'. A few limonite coated fractures with very weak alt are present.
286.7	295.4	8.7	99	0.01	Siltstone, similar to above. Gray green, calcareous, and massive. Numerous blebs of black siltstone.
295.4	305.4	10.0	96	0.01	Siltstone, similar to above. A few laminations (bedding) dip 70°.
305.4	315.5	10.1	94	0.06	Siltstone and fault breccia. Siltstone, similar to above, extends to 306.8'. Breccia of siltstone frags in serp. gouge extends to 309.0'. Contacts of bx are high angle. Below this fault zone the siltstone is cut by thin zones of bx dipping 70-90°. A very few tiny grains of py are visible in the bx zones.
315.5	325.6	10.1	93	0.01	Siltstone and breccia. Gray slightly calc. siltstone cut by irregular breccia-gouge zones. Trace of cpy near middle of run.

SUMMARY - D. D. HOLE 238 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
325.6	336.1	10.5	87	0.01	Arkose, graywacke, and br. Gray fine grained arkose extends to 330.0', and shows 58° lam. bedding at contact. Below is a greenish gray, graywacke. Fine grains of qtz and feld are set in a slightly serp. matrix. This extends to 333.8'. The rest of the run is breccia and gouge of the graywacke. No alt. or mineralization seen.
336.1	347.4	11.3	94	0.01	Arkose and siltstone. Arkose similar to that in previous run, interbedded with green sandy siltstone. Siltstone partly sheared. Run ends in arkose.
347.4	358.0	10.6	93	0.01	Arkose. Gray, medium grained, to 353.5'. Below is very fine-grained greenish, with 80° bedding stratification.
358.0	367.4	9.4	60	0.01	Arkose. Greenish, similar to last part of previous run, changes to gray fine-grained arkose at 360.0'. Poor recovery below 362 -- may contain interbedded black siltstone, as a few fragments of this type were recovered.
367.4	381.0	13.6	90	Nil	Siltstone, gray black, calcareous. 80° stratification. Shearing along bedding planes in upper part of run. No mineralization.
381.0	393.2	12.2	92	Tr	Siltstone, similar to above, grades down into greenish sandy siltstone.
393.2	404.5	11.3	97	0.01	Siltstone, similar to above types. Principally massive, with only a few steep laminations.
404.5	414.8	10.3	93	0.01	Siltstone, similar to above. Massive, with one laminated zone which dips 65°.
414.8	425.0	10.2	96	0.01	Siltstone and arkose. Siltstone is similar to above, but is thin to medium-bedded, dips about 50°. Grades across a thin-bedded zone into arkose, gray and fine-grained at 421.5'. Brecciated bed of siltstone occurs at 423. Run bottoms in arkose. No mineralization.

B o t t o m

ASSAY DATA - D. D. HOLE NO. 238
Started 8/13, 8/25/59 Completed 8/14, 9/2/59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	221.0	221.0	Rockbit			
221.0	224.3	3.3	-	-	0.02	-
<u>B o t t o m</u>						
224.3	236.5	12.2	84.5	-	0.02	-
236.5	250.6	14.1	80.8	-	0.01	-
250.6	260.5	9.9	91.1	-	0.02	-
260.5	275.0	14.5	97.2	-	0.02	-
275.0	286.7	11.7	96.0	-	0.01	-
286.7	295.4	8.7	98.9	-	0.01	-
295.4	305.4	10.0	96.1	-	0.01	-
305.4	315.5	10.1	94.5	-	0.06	-
315.5	325.6	10.1	92.8	-	0.01	-
325.6	336.1	10.5	86.9	-	0.01	-
336.1	347.4	11.3	93.8	-	0.01	-
347.4	358.0	10.6	92.7	-	0.01	-
358.0	367.4	9.4	60.0	-	0.01	-
367.4	381.1	13.6	90.3	-	Nil	-
381.0	393.2	12.2	92.3	-	Trace	-
393.2	404.5	11.3	97.0	-	0.01	-
404.5	414.8	10.3	92.5	-	0.01	-
414.8	425.0	10.2	96.0	-	0.01	-

B o t t o m

SUMMARY - DIAMOND DRILL HOLE NO. 239
5870N 5530E Collar Elevation 3029.5'

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	278.2	278.2	-	-	Rockbit through alluvium. Bedrock estimated at 270'. Character samples indicate bedrock to be gray siltstone.
278.2	281.0	2.8	72	0.03	<u>Siltstone</u> . Gray, calcareous. Bedding laminations dip 68°. Yellow transported limonite is spotted through rock and coats fractures. No mineralization seen.
281.0	296.5	15.5	90	0.01	<u>Siltstone</u> , similar to above to a gradation, beginning about 283', into dark gray siltstone. This is calcareous and shows 85° laminated bedding, which flattens about 291' to 50°. At about 293' the rock becomes a uniformly thin-laminated siltstone with alteration light gray and dark gray to black beds. Calcareous. Trace of limonite on fractures. Unmineralized.
296.5	305.7	9.2	84	0.01	<u>Siltstone</u> . Gray, fractured, with yellow limonite, to 299.7'; shows dips 60-90°. Below 299.7' rock is a uniformly laminated siltstone-mudstone of alternating black and gray layers. Thickness of beds varies from paper-thin to 1/2". Calcareous. Unaltered and unmineralized. Dips 40°.
305.7	315.7	10.0	96	0.01	<u>Siltstone</u> , laminated, similar to above. Dips 20 to 40°.
315.7	329.5	13.8	95	0.02	<u>Siltstone</u> , similar to above. From 321-323 a crushed zone, shows vertical dips, elsewhere dips 40°. Near bottom of run the laminations become thicker.
329.5	344.6	15.1	82	0.02	<u>Siltstone</u> , similar to above. Beds 1/8" to 3" thick. Dips 50°, locally steeper.
344.6	357.7	13.1	97	0.02	<u>Siltstone and sandy siltstone</u> . Similar to above to 348'. Below beds of gray calcareous sandy siltstone alternate with beds of laminated black siltstone. Beds 1/2' to 1'. Dips 40°.
357.7	371.5	13.8	94	0.02	<u>Siltstone and sandy siltstone</u> , similar to above, alternating 1/2-1' beds. Dips 40°.
371.5	378.0	6.5	88	0.02	<u>Siltstone and sandy siltstone</u> , alternating, similar to above.
378.0	392.2	14.2	95	0.06	<u>Shaly limestone</u> . Finely laminated varve-like white limestone alternating with black calcareous siltstone. The paper-thin areas have a slightly wrinkled surface. Dips 40-50°. Below 383' are a few interbeds of more thickly laminated siltstone. Unmineralized.

SUMMARY - DIAMOND DRILL HOLE NO. 239
5870N 5530E Collar Elevation 3029.5'

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	278.2	278.2	-	-	Rockbit through alluvium. Bedrock estimated at 270'. Character samples indicate bedrock to be gray siltstone.
278.2	281.0	2.8	72	0.03	<u>Siltstone</u> . Gray, calcareous. Bedding laminations dip 68°. Yellow transported limonite is spotted through rock and coats fractures. No mineralization seen.
281.0	296.5	15.5	90	0.01	<u>Siltstone</u> , similar to above to a gradation, beginning about 283', into dark gray siltstone. This is calcareous and shows 85° laminated bedding, which flattens about 291' to 50°. At about 293' the rock becomes a uniformly thin-laminated siltstone with alteration light gray and dark gray to black beds. Calcareous. Trace of limonite on fractures. Unmineralized.
296.5	305.7	9.2	84	0.01	<u>Siltstone</u> . Gray, fractured, with yellow limonite, to 299.7'; shows dips 60-90°. Below 299.7' rock is a uniformly laminated siltstone-mudstone of alternating black and gray layers. Thickness of beds varies from paper-thin to 1/2". Calcareous. Unaltered and unmineralized. Dips 40°.
305.7	315.7	10.0	96	0.01	<u>Siltstone</u> , laminated, similar to above. Dips 20 to 40°.
315.7	329.5	13.8	95	0.02	<u>Siltstone</u> , similar to above. From 321-323 a crushed zone, shows vertical dips, elsewhere dips 40°. Near bottom of run the laminations become thicker.
329.5	344.6	15.1	82	0.02	<u>Siltstone</u> , similar to above. Beds 1/8" to 3" thick. Dips 50°, locally steeper.
344.6	357.7	13.1	97	0.02	<u>Siltstone and sandy siltstone</u> . Similar to above to 348'. Below beds of gray calcareous sandy siltstone alternate with beds of laminated black siltstone. Beds 1/2' to 1'. Dips 40°.
357.7	371.5	13.8	94	0.02	<u>Siltstone and sandy siltstone</u> , similar to above, alternating 1/2-1' beds. Dips 40°.
371.5	378.0	6.5	88	0.02	<u>Siltstone and sandy siltstone</u> , alternating, similar to above.
378.0	392.2	14.2	95	0.06	<u>Shaly limestone</u> . Finely laminated varve-like white limestone alternating with black calcareous siltstone. The paper-thin areas have a slightly wrinkled surface. Dips 40-50°. Below 383' are a few interbeds of more thickly laminated siltstone. Unmineralized.

SUMMARY - D. D. HOLE 239 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
392.2	405.5	13.3	100	0.04	<u>Shaly ls, siltstone, and sandy siltstone.</u> The first unit, similar to above, extends to a broken zone at 295'. At this point thinly laminated black calcareous siltstone begins; changes to massive black siltstone at 400', and grades in depth toward end of run into gray sandy siltstone. Dips about 40°, although locally steeper dips are present. Massive toward end of run.
405.5	417.8	12.3	91	0.02	<u>Arkose and siltstone, interbedded.</u> The arkose initiates the run, and is gray, weakly calcareous, fine-grained. The siltstone is black, and calcareous. Beds are 1-3' thick. No mineralization or alteration. Dips 40°.
417.8	424.8	7.0	99	0.02	<u>Arkose and siltstone, interbedded, similar to above.</u>
424.8	433.2	8.4	97	0.02	<u>Siltstone and shaly limestone.</u> Black massive siltstone, with a thin interbed of arkose, begins run and extends to 428'. Below, laminated black and gray calcareous siltstone interbedded with thin zones of varve-like shaly limestone, extends to end of run. Dips 45-50°.
433.2	441.6	8.4	100	0.06	<u>Siltstone and shaly limestone.</u> Similar to above. Shaly ls in 1' beds makes up majority of run. Dips 45°. Some beds highly contorted -- possibly a sedimentary structure.
441.6	449.7	8.1	100	0.05	<u>Siltstone and shaly ls.</u> Similar to above. Siltstone predominates.
449.7	458.8	9.1	95	0.01	<u>Arkose and siltstone.</u> Gray fine-grained arkose initiates run and extends to 452.4'; stratification dips 45°. Below this, black and gray laminated siltstone extends to end of run. Some thin zones of shaly ls are present. All the rocks are somewhat calcareous, except for a few beds of black siltstone or mudstone.
458.8	470.0	11.2	94	0.03	<u>Siltstone, similar to lower portion of previous run.</u> Thicker bedded toward end of run. Dips 55°. No mineralization or alteration.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE NO. 239

Started: 9/3/59

Completed: 9/16/59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	278.2	278.2	-	None	-	None
278.2	281.0	2.8	-	-	0.03	-
281.0	296.5	15.5	89.9	-	0.01	-
296.5	305.7	9.2	83.9	-	0.01	-
305.7	315.7	10.0	96.4	-	0.01	-
315.7	329.5	13.8	95.0	-	0.02	-
329.5	344.6	15.1	81.6	-	0.02	-
344.6	357.7	13.1	97.0	-	0.02	-
357.7	371.5	13.8	94.4	-	0.02	-
371.5	378.0	6.5	87.6	-	0.02	-
378.0	392.2	14.2	95.0	-	0.06	-
392.2	405.5	13.3	104.7	-	0.04	-
405.5	417.8	12.3	90.8	-	0.02	-
417.8	424.8	7.0	98.7	-	0.02	-
424.8	433.2	8.4	96.6	-	0.02	-
433.2	441.6	8.4	101.2	-	0.06	-
441.6	449.7	8.1	99.7	-	0.05	-
449.7	458.8	9.1	95.2	-	0.01	-
458.8	470.0	11.2	93.9	-	0.03	-

Bottom

SUMMARY - DIAMOND DRILL HOLE NO. 240
2560N 5150E Collar Elevation 3079.5'

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec.%</u>	<u>% Cu Core</u>	<u>Geology</u>
0.0	246.9	246.9	-	-	Rockbit; alluvium.
246.9	250.8	3.9	98	-	Caliche conglomerate.
250.8	253.7	2.9	100	-	Caliche conglomerate.
253.7	264.1	10.4	90	0.03	<u>Siltstone and arkose.</u> Bedrock contact is at beginning of run. Bedrock is a soft, yellow, calcareous siltstone. Bedding laminations dip 40°. This type extends to 259.2', at a sharp sedimentary contact with banded light pink to grey, weakly calcareous siltstone. This rock is moderately hard; 40° bedding. This unit extends to a sharp sedimentary contact with fine-grained yellow gray arkose, at 261.5'. Stratification dips 40°. This unit is calcareous, and contains fractures coated with films of yellow limonite, and manganese oxides. No Cu mineralization present.
264.1	274.5	10.4	84	0.03	<u>Arkose and siltstone.</u> The former, similar to above, extends to 268.4' where it contacts soft yellow siltstone similar to upper unit of previous run. Arkose is calcareous; siltstone is very weakly or non-calcareous. Abundant yellow limonite appears on fractures in the arkose. Most appears to be transported but part may derive from originally pyritic veinlets. The siltstone is brecciated and our core loss was considerable.
274.5	282.7	8.2	100	0.03	<u>Arkose.</u> Gray, medium-grained, weakly calcareous. Abundant limonite in tiny diss specks gives the rock a yellowish color. The lower half of the run is brecciated along vertical(?) shears and mixed with yellow siltstone or gouge. Weak kaolin alteration and some yellow limonite derived from pyrite. No copper mineralization is evident.
282.7	289.0	6.3	97	0.12	<u>Conglomerate and arkose.</u> Run begins with arkose, similar to above, and continues to 283.3' where it overlies conglomerate with a 60° contact. The conglomerate is composed of 1/8 - 1" pebbles of arkose and shale, moderate to well-rounded, set in an arkose matrix, yellow limonite stains the matrix and pebbles. The conglomerate, extends to 287.3', and overlies medium-grained arkose similar to that above the conglomerate. No mineralization evident. The limonite appears to be transported.
289.0	298.6	9.6	99	0.02	<u>Arkose and siltstone.</u> Arkose, similar to above, extends to a 45° contact, at 290.7', with white to tan siltstone interbedded with fine-grained arkose. Stratifications dip 40°. Limonite and manganese oxides coat fractures. Some py may originally have been present.
298.6	304.9	6.3	95	0.02	<u>Siltstone.</u> Light gray, stained yellow in places with limonite. Interbeds of sandy siltstone are 1/2 to 1 1/2' thick. Dips are about 40°. No Cu mineralization evident. Small amount of py may have been present.

SUMMARY - D. D. HOLE 240 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
304.9	314.3	9.4	92	0.02	<u>Siltstone, laminated.</u> First part of run is gray and yellow, and this grades down into laminated black and gray siltstone with a trace of yellow limonite. Dips 40-45°. Weakly calcareous.
314.3	321.4	7.1	100	0.01	<u>Siltstone, similar to above.</u> Trace of limonite-hematite. No alteration or mineralization.
321.4	336.2	14.8	98	Tr	<u>Siltstone and arkose.</u> The former extends to 326.7', to a 45° contact above arkose. The arkose is gray, fine-grained, with black laminations of siltstone dipping 45-60°. This forms a 3' bed, and extends to black siltstone at 329.7'. All rocks calcareous. The upper siltstone unit is nearly massive, whereas the bottom unit is laminated and contains thin interbeds of arkose. Broken core in a serpentinized or faulted zone at end of run.
336.2	351.5	15.3	99	0.02	<u>Siltstone.</u> The first part of run is gray, fine-grained silty arkose with black siltstone partings. Stratification dips 40-45°. This unit extends to 344.3'. Below is black laminated siltstone with thin beds of varve-like silty limestone; 40° dips. No alteration or mineralization.
351.5	365.6	14.1	100	0.02	<u>Siltstone and arkose.</u> Laminated black siltstone, similar to above, extends to 355.6'. Here the siltstone lies on an irregular channeled surface cut on gray, coarse- to fine-grained arkose. Within the arkose are occasional 4" beds of black siltstone, and black flakes of siltstone are aligned along the bedding of the arkose. Dips are about 40°. Syngenetic(?) py is associated with the varve limestone. Trace of diss py in the arkose.
365.6	375.6	10.0	100	0.01	<u>Arkose and siltstone.</u> An upper unit, extending to 372.7', consists of siltstone alternating with fine-grained arkose; beds 1/8" to 6" thick. The lower unit, extending to 375.6', is a coarse-grained arkose similar bottom unit of previous run.
375.6	384.5	8.9	96	0.02	<u>Arkose, similar to above,</u> with a 2.7' bed of black laminated siltstone near middle of run. The arkose is laminated, fine to coarse-grained, gray, with fragments of black siltstone. Trace of py.
384.5	399.1	14.6	66	0.02	<u>Arkose and siltstone.</u> The arkose is similar to above. Zones of 1/4" qtz and feld grains are common, and there are scattered pebbles. Last 3' of core was lost, and was evidently a soft black siltstone.
399.1	406.1	7.0	98	0.02	<u>Siltstone, arkose and limestone,</u> in thin interbeds. Dips about 40°. The last foot is a black varve-like silty limestone.

SUMMARY - D. D. HOLE 240 - CONTINUED

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>Core Rec. %</u>	<u>% Cu Core</u>	<u>Geology</u>
406.1	416.0	9.9	96	0.02	Limestone and siltstone. The limestone occurs as black, varve-like, paper-thin beds of silt and limestone. Weak carboniferous odor when crushed. Laminated siltstone interbeds separate the limestones. This unit extends to about 411.3'. Below is black calcareous siltstone, with a few laminations.
416.0	425.9	9.9	97	0.12	Siltstone, similar to above. Black and gray, calcareous. Varies from beds 4" thick to thinly-laminated. Dips 40°. No mineralization evident.
425.9	435.6	9.7	97	0.02	Siltstone, similar to above. Below 429.7', the rock is strongly crushed, with abundant black serpentine or slick gouge. In this zone bedding is contorted.
435.6	447.7	12.1	99	0.03	Arkose and siltstone. The first foot of core is arkose, which is followed by 1.4' of crushed black siltstone, with an occasional breccia fragment of arkose. The remainder of the run is arkose, with a few thin black siltstone partings. The arkose is gray, fine- to coarse-grained, with fragments of black siltstone. The coarse-grained variety is prominent toward the bottom, with 1/4" grains of qtz and feldspar. Dips vary from 10° to 45°, about 40° being average. Stratification is shown by sorted grain sizes, in thin-laminated beds.
447.7	454.0	6.3	90	0.02	Arkose and siltstone. The arkose is similar to above, and extends to 450.1'. Here an interbedded zone of arkose and siltstone initiates the next unit. This begins at 451.1', and is black calcareous siltstone. The upper foot is crushed. A few 1" beds of very limy varve-like siltstone with weak carbonaceous odor are present. No mineralization or alteration is present.

B o t t o m

ASSAY DATA - DIAMOND DRILL HOLE NO. 240

Started: 9/17/59

Completed: 9/27/59

<u>From</u>	<u>To</u>	<u>Interval</u>	<u>% Recovery</u>		<u>% Assay</u>	
			<u>Core</u>	<u>Sludge</u>	<u>Core</u>	<u>Sludge</u>
0.0	223.5	223.5	Rockbit			
223.5	226.0	2.5	No Recovery			
226.0	246.9	20.9	Rockbit			
246.9	250.8	3.9	97.5	-	-	-
250.8	253.7	2.9	100.0	-	-	-
253.7	264.1	10.4	90.5	-	0.03	-
264.1	274.5	10.4	84.0	-	0.03	-
274.5	282.7	8.2	100.0	-	0.03	-
282.7	289.0	6.3	97.0	-	0.12	-
289.0	298.6	9.6	99.1	-	0.02	-
298.6	304.9	6.3	94.8	-	0.02	-
304.9	314.3	9.4	92.2	-	0.02	-
314.3	321.4	7.1	102.1	-	0.01	-
321.4	336.2	14.8	98.0	-	Trace	-
336.2	351.5	15.3	98.5	-	0.02	-
351.5	365.6	14.1	99.5	-	0.02	-
365.6	375.6	10.0	100.3	-	0.01	-
375.6	384.5	8.9	96.0	-	0.02	-
384.5	399.1	14.6	65.5	-	0.02	-
399.1	406.1	7.0	98.0	-	0.02	-
406.1	416.0	9.9	95.5	-	0.02	-
416.0	425.9	9.9	96.9	-	0.12	-
425.9	435.6	9.7	97.4	-	0.02	-
435.6	447.7	12.1	98.6	-	0.03	-
447.7	454.0	6.3	89.7	-	0.02	-

Bottom

Tucson Citizen - May 14, 68



San Xavier Trail 1

Petrographic Rock Name: _____

Megascopic: Light grey str-monticite(?) porphyry
A large (.8 inch) zoned plagioclase (?) in
center of hand specimen

Formation: _____

DDH No. X 120 @ 536 ft. Depth

Sent for: T.S. ☒ P.S.

Date: 12/11/57

Other Location: _____

By: J E K Date 12-13-57
Purpose: Determination of rock type. Compare
to East Pima meta porphyry and to X-120 at
532.6'.

Microscopic by: _____ Date _____

For additional comments use/see reverse

San Xavier Trail

Petrographic Rock Name: _____

Microscopic: Contact between brown pebbly
arkose and a porphyritic light grey andesite (?)
The andesite (?) is distinctly less porphyritic
and finer-grained near this contact than to-
wards the center of the mass (5.5' in-
tercept)

By: JEK Date 12/13/57
Tutorial: Study contact, determine rock types
and compare the andesite (?) to the East Arm
metaporphry. Look for field'ation in sediment.
Microscopic of: _____ Date _____

Formation: ?
DDH No. X 120 @ 532.6 ft. Depth
Sent for: T.S. ✓ P.S. —
Date: 12/17/57
Other location: _____

For additional comments use/see reverse

PROPERTY

San Xavier Tract 2

Petrographic Rock Name:

Microscopic: light grey, distinctly porphyritic phase of the meta-porphyr. The matrix is quite chert and quartzose-appearing. Biotite fairly abundant.

By: J E K

Date 12/13/57

Purpose: To determine if the quartzose matrix is the original igneous groundmass or if it is formed by substitution.

Microscopic by: _____ Date _____

Formation: Meta-porphyr.

DDH No. X-220 @ 438 ft. Depth

Sent for: T.S. ✓ P.S. _____

Date: 12/17/57

Other Location: _____

For additional comments use/see reverse

San Xavier Res.

SE $\frac{1}{4}$ Sec 26 T16S R12E

1 - C.D.H. 250' TD Cosmo log

Bedrock (?) 160-170'

Gravel all 180-210

SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec 26 T16S R12E

Drilled 54, dry hole 250' TD

0-100 Gravel fill or wash

-155 Gr. wash & red clay

220 Rotten Blue gr. sh. or crush

250 Red clay & gr. wash.

Sec 26 unidentified 750' TD

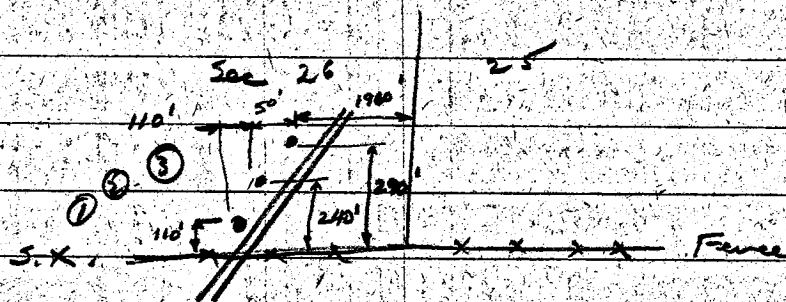
B.R. possibly 185'. Drilled log no good.

NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 24 T16S R12E

Alluvium to 210

210-230 Crushed arkose

230-300 Arkose, w/ some py, mag.



V. Geoph. 1954

S. X. Res.

#1 So hole

0-150 alluv.

-157 Shale (limy) dark gray - Permian? shows minor mineralization.

-171 Same, increasing mineralization.

-185 Brown limy shale & mud.

-216 Same as 171-185

-228 Blue gray calcareous

-242 Green iron silicate (ferruginous?)

-256 Gray Blue calcareous, begins to be sandy.

-284 Same 242-256

-414 Same 242-256, color becomes brown
T.D.

#2 0-148 alluv.

-157 Recrystallized bedrock. Arkose or ls.

-161 Gray green siliceous material

-168 Gray, fractured, vuggy, calcite-veined, magnetite rich andesite. (cored)

-182 Brown volcanic w/ calcite stringers, flunits.

-210 Same gray-green volcanic, much finer, less weathered.

T.D. 210'

#3 North hole

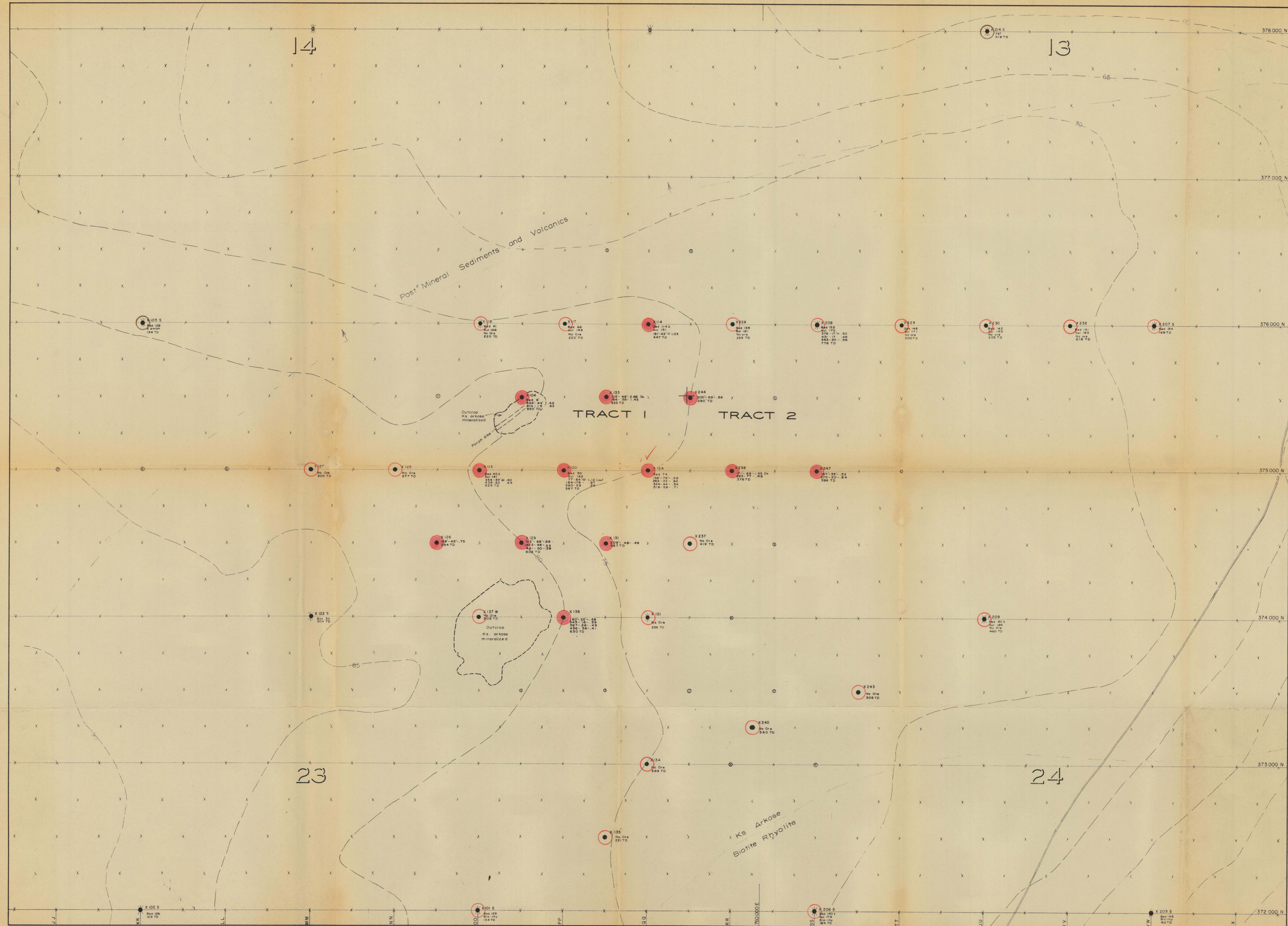
0-154 alluv.

-182 Brown altered volcanics

-300 Gray block, less altered volcanics

T.D. 300'

10 50
1/2 mile



Hole Numbering System on Reservation
Tract I — X 101, X 102, etc.
Tract II — X 201, X 202, etc.
Tract III — X 301, X 302, etc.
Shallow Holes Designated X 101 S, etc.

Holes Drilling ☒ X 206 S

Hole Location Prepared ☐

Holes To Be Drilled Next ☒ Deep ☒ Shallow

Holes Complete But All Assays Not Available ☒

Magnetic High (Erwin Letter 9-11-57) ☒

Relative Gravity Contours
CI = 0.5 milligal
(Seegart report 12-10-57)

Hole in post-mineral rocks only ☒

Hole in mineralized bedrock ☒

Hole in possible open pit ore ☒

TO ACCOMPANY LETTER
DATED May 1, 1958
BY Kenyon Richard

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP
CENTRAL TRACT III
SCALE 1" = 300'

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 21, 1959

FILE MEMORANDUM

SAN XAVIER RESERVATION
Zones of Mineralization on Proposed Mining Leases

Our Mineral Prospecting Permits on the Reservation state that applications for mining leases shall include "...such acreage as is reasonably proven productive, supported by factual information, ...". The amount and type of "factual information" required would seem to be uncertain.

All exploration work was conducted by diamond drilling. As this work progressed, maps showing locations of drillholes together with detailed geologic and assay logs of the holes were sent periodically to Mr. R. S. Fulton, Regional Mining Supervisor, U. S. Geological Survey, who has the responsibility of checking on all exploration and mining done on the Reservation. Copies of all these data were sent also to Messrs. Gilmore and Haverland of the Bureau of Indian Affairs. These drillhole logs and maps themselves may satisfy the requirement for factual information. But if such proves not to be the case, the following interpretive information relative to potential ore reserves should suffice. It is presumed that, in any event, duplicates of the drillhole logs need not be included with lease applications.

Two mineralized areas about two miles apart have been found by the drilling. One is situated in the southern part of Tract II; the other is partly in Tract I and partly in Tract II, and involves the common corners of Sections 13, 14, 23 and 24 (T 16 S, R 12 E).

The southern zone consists of two potential ore bodies, both of which are extensions of the same ore zone that this Company is now developing into an open pit mine in the ground just south of the Reservation. One of these occurrences is shallow and amenable to open pit mining; the other is deep and probably accessible only to underground mining.

The shallow mineralization of the southern zone is estimated to consist of about 10 million tons of ore of the "indicated" classification with a copper content in excess of 0.4%. It is penetrated by vertical drillholes which are distributed over a triangular-shaped area 1100 feet north-south by 2000 feet east-west. Following are the ore intercepts in these drillholes:

<u>Hole No.</u>	<u>Depth to Top of Ore</u>	<u>Vertical Thickness of Ore</u>	<u>Average % Cu</u>
X-202	282'	150'	.62
X-211	203	126	1.21
X-212	206	31	2.53
X-213	224	86	1.55
X-215	211	169	.74
X-220	204	58	.85
X-224	268	61	.77
X-242	205	37	1.60
X-245	253	275	.85
X-246	365	130	.88
X-251	206	51	3.08
X-253	219	46	1.41
X-254	374	59	.74
X-255	217	69	.88
X-256	216	54	.88
X-258	224	73	1.11
X-260	233	33	.89
X-262	267	89	.55
X-263	204	32	1.38

The deeper mineralization described above partly underlies the shallow ore body. It is estimated to consist of 50 to 75 million tons of ore, but this is classed only as "inferred" ore because it is penetrated by only five, wide-spaced drillholes, as follows:

<u>Hole No.</u>	<u>Depth to Top of Ore</u>	<u>Vertical Thickness of Ore</u>	<u>Average % Cu</u>
X-213	365'	398'	.47
	990	74	.83
X-217	1172	159	.66
X-224	561	116	.76
X-231	772	277	.47
	1093	144	.80
	1258	79	1.48
X-250	865	95	1.02

The northern mineralized zone is estimated to contain 15 to 20 million tons of possibly eventual ore which could be reached by open pit mining. It is penetrated by drillholes which are rather wide-spaced; therefore, this ore is classed as "indicated". This mineralization lies both in Tract I and Tract II:

TRACT I

<u>Hole No.</u>	<u>Depth to Top of Ore</u>	<u>Vertical Thickness of Ore</u>	<u>Average % Cu</u>
X-104	334'	44'	.66
X-113	354	39	.40
X-114	151	43	1.03

TRACT I (Continued)

<u>Hole No.</u>	<u>Depth to Top of Ore</u>	<u>Vertical Thickness of Ore</u>	<u>Average % Cu</u>
X-120	77'	84'	1.12
	184	178	.87
	390	59	.58
X-124	138	79	.59
	263	22	.82
	324	44	.54
X-126	168	45	.75
X-129	312	88	.58
	423	48	.55
	491	50	.59
X-131	209	49	.49
X-133	105	48	2.68
	166	35	1.45

TRACT II

X-238	171	69	1.55
	293	77	.48
X-244	200	69	.56
X-247	187	35	.52
	270	20	.84

Original Signed By
K. Richard

KENYON RICHARD

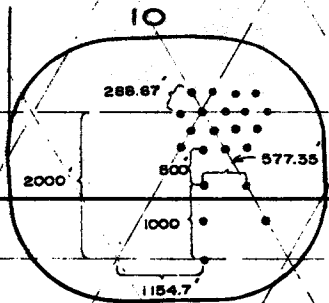
KR:S
cc: ACHall

TRACT 1

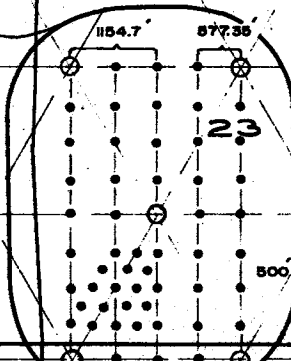
TRACT 2

Coast & Geodetic
Survey Coordinates

EXAMPLE OF CLOSE-SPACED DRILL GRID.



EXAMPLE OF GRAVITY STATIONS,
BULLDOZER TRAILS AND
CLOSE-SPACED DRILL GRID



Proposed Early Deep Holes

Mineralized Outcrop

Water well (mineralized)

Water well (mineralized)

AERO-MAG HIGH

Proposed Shallow Holes

Proposed First Deep Holes

South Boundary of Reservation

T.16 S
T.17 S

SAN XAVIER PROJECT
PROPOSED EXPLORATION GRID

Scale 1" = 1/2 mile

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 16, 1959

MEMORANDUM FOR K. E. RICHARD

SAN XAVIER DRILLING

Drill hole X-264 has been completed at 1178.3, after penetrating a clastic series, and lime-silicated series, marble and limestone, and the basement thrust and granite below.

A summary log is attached.

JOHN E. KINNISON

Attachment
JEK/ds

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. X-264Location XX.25SAN XAVIER366.25Depth of Hole 1178.3 (Bottom)Collar Elev. 1205.9

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
<u>568.4</u>	<u>93</u>	<u>Argillite, arkose and sandy argillite. A thick sequence of rocks which grade without bedding plane breaks into one another. Alteration to chlorite is common along fractures. Colors are buff, gray, and mottled, with some black zones. A very occasional zone of thin laminated rock suggests that the series dips 50 or 60°. No other bedding is present. Post ore faults at 825-829', and at 852'. Sulphides are mainly py. Cu content weak to sparse.</u>
<u>883.6</u>	<u>90</u>	<u>Tactite and diopside hornfels. A transitional zone marks the contact between the copper clastics and this lime silicate series. Sulphides are mostly py, and generally weak. Cu content - weak.</u>
<u>904.9</u>	<u>86</u>	<u>Marble, tactite, and hornfels, interbedded. Shear zone at bottom dips 20°. Cu content - nil. Virtually no sulphides.</u>
<u>927.0</u>	<u>95</u>	<u>Gray limestone and white marble, locally fossiliferous (poorly preserved - unidentifiable). 995-1000' contains chert</u>

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
504.7	516.4	.20	704.2	714.3	.11
516.4	524.9	.20	714.3	720.5	.16
524.9	536.9	.26	720.5	728.1	.16
536.9	547.3	.24	728.1	737.7	.15
547.3	557.5	.21	737.7	747.4	.19
557.5	568.4	.24	747.4	760.6	.18
568.4	578.1	.24	760.6	770.6	.12
578.1	591.6	.15	770.6	778.1	.19
591.6	602.8	.09	778.1	790.7	.24
602.8	611.0	.21	790.7	803.0	.25
611.0	623.7	.21	803.0	813.2	.18
623.7	635.9	.25	813.2	824.5	.13
635.9	645.9	.21	824.5	828.9	.16
645.9	657.9	.15	828.9	839.4	.14
657.9	666.8	.12	839.4	852.3	.17
666.8	679.3	.18	852.3	863.3	.14
679.3	685.4	.14	863.3	871.6	.12
685.4	695.4	.26	871.6	881.0	.07
695.4	704.2	.20	881.0	883.6	.54

(continued)

ASARCO

D. D. Hole No. **X-264 - continued**

PRELIMINARY GEOLOGIC LOG

Location _____

SAN XAVIER

Depth of Hole _____

Collar Elev. _____

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
		nodules. Sulphides nil. Fault zone near bottom. 40-60° laminations locally.
1035.4	54	Tactite, hornfels, and argillite, interbedded. Numerous fault zones. Cu content - nil.
1111.7	95	Shear zone, large fragments and up to 3' intercepts of red siltstone, red arkose, and gray to buff ark and arg. Tightly bounded by chlorite shears. Definite low angle shears (15-30°) near bottom. Cu content - nil.
1145.4	94	Shear zone - mylonite. Highly colored, thin banded and resembles a thin bedded argillite, local bx texture; dip 20-30°. Cu content - nil.
1152.6	97	Sierrita granite. Crushed near shear zone. No other mineralization.
1178.3	Bottom	

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
883.6	894.2	.17			
894.2	904.9	.21			
904.9	911.5	.06			
911.5	922.3	.19			
922.3	927.0	1.10			
927.0	942.1	.02			
942.1	955.5	.02			
955.5	962.4	.01			
962.4	972.7	.03			
972.7	981.2	.07			
981.2	995.2	.02			
995.2	1009.2	.02			
1009.2	1015.9	.02			
1015.9	1026.0	.02			

John E. Kinnison

6/6/59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 16, 1959

MEMORANDUM FOR K. E. RICHARD

SAN XAVIER RESERVATION
Drilling, Weekly Report
June 6-13, 1959

During the subject week the Boyles Bros. 22 Diamond Drill was moved to Tract I; A-A, 376. Overburden was drilled to 110 feet when a chuck wrench fell in the hole. At the end of the week no progress had been made in recovering the wrench, and the hole was ^{caved} cored to a depth of 40 feet.

JOHN E. KINNISON ✓

JEK/ds

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 17, 1957

MEMORANDUM TO MR. R. J. LACYPRELIMINARY INTERPRETATION
Gravity Survey
San Xavier Indian Reservation
Pima County, Arizona

The attached map shows the extent of relative gravity reductions completed at this time. Please note the anomaly designation which is used for the Indian Reservation.

Generalized Interpretations

- 1) The regional gravity gradient observed on the East Pima property is also present within our San Xavier I. R. tracts.
- 2) The increase in regional gradient on the Indian ground should be attributed to overburden thinning to the west.
- 3) Anomaly X-1. X-1 is a relative gravity high, located west of the projection of the East Pima bottom thrust fault. The location is favorable - i.e. likelihood of geologically favorable calcareous section. A bedrock hill, as the anomalous source, is unlikely since holes X-201 and X-202 intersected bedrock at 220 and 200 feet respectively. I interpret the source to be heavy silicates developed in calcareous rocks (source of anomalies 1, 2 and 4 - East Pima). Hole X-211 (drilling) should define the anomalous source. If X-211 is an encouraging hole, I suggest another location at ZZ-366.0.
- 4) Anomaly X-2. This positive anomaly lies east of the projection of the East Pima bottom thrust fault. The source is probably a bedrock hill. One hole is recommended at D-366.0. If bedrock is less than 150 feet, the hole can be stopped. If depth to bedrock is in the order of 200 feet, the hole should be drilled to 400-500 feet.
- 5) Anomaly X-3. This is a large (areally) negative gravity feature. The boundaries of X-3 correspond closely to the boundaries of the magnetic high which John Erwin interprets as thick volcanics. If the regional gravity influence were removed, the anomaly would exhibit several residual gravity contours, the majority being concentrated along its margins. The source, therefore, should have steeply dipping boundaries. Assuming the source is basalt flow, the gravity results compliment the magnetic interpretation of thick volcanics. Specific gravity tests of the core are now being made to determine if a density contrast exists between the fine grained basalt and adjacent arkose.

October 17, 1957

- 6) Anomalies X-3a and X-3b. These gravity high ridges are interpreted as topographic hills on the basalt surface.
- 7) Anomaly X-4. X-4 is a collective designation of a group of gravity highs. Two maxima are labeled as X-4a and X-4b. A third maximum, which will be designated X-4c, exists within the uncontoured area at 00-374 (the topographic correction has not yet been made for the arkose hill at this location).

The anomalies X-4a and X-4b are associated with bedrock outcrops. A bedrock hill has been demonstrated at UU-374 (depth to bedrock, hole X-209, is 86 feet). This hill provides the source for anomaly X-4b. Gravity high X-4 may be entirely explained by a general thinning of overburden. Using the bedrock depths determined by the shallow hole drilling, I plan to calculate the gravity anomaly (order of magnitude only) that should result from overburden thinning. If the calculated intensities are considerably less than those observed, the area will warrant additional deep drilling.

The possibility that these anomalies are not entirely due to bedrock relief is suggested by the bedrock depth in hole X-208S - 153 feet. The hole is located on the axis of gravity ridge X-4b. This depth may be too great to satisfy the observed gravity anomaly.

A hole at UU-376.8 would allow us to make a better evaluation of anomaly X-4a. I recommend this location.

- 8) Anomaly X-5. This gravity high is due to a buried bedrock hill; hole X-112S at MM-370.0 reached bedrock at 50 $\frac{1}{2}$ feet.
- 9) Gravity irregularities in the southwest portion of tract I are due to variations of gravel thickness in an area of near outcrop environment. No further interpretation can be made.
- 10) Gravity results in the area between DD and II and between 370N and 372N are questionable. Contours will be completed after check results are available.

Conclusions

The anomalies collectively called X-4 represent the only area, within the present coverage, where important concentrations of lime-silicates can exist at moderate depths. This statement excludes anomaly X-1 which would be an extension of the East Pima environment.

It may be significant that the extent of hydrothermal alteration determined by the drilling program is almost entirely within the general area termed X-4.

W. E. SARGENT

WES/ds

Enclosure: 1000 Scale relative gravity contour
map of E. Pima and San Xavier properties

cc - w/encl

LEHart, KERichard, BCMorrison, JLCClark, RCribbs

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 7, 1958

MEMORANDUM TO MR. R. J. LACY

GRAVITY SURVEY
San Xavier Indian Reservation
Pima County, Arizona

The attached relative gravity contour map shows the completed results of the Indian Reservation survey. The field work was completed January 3 and the reduction and plotting on January 6.

Interpretation

Relative gravity contours north of 380N are interpreted as follows:

- 1) Most, if not all, of this area is underlain by post mineral rocks.
- 2) X-14 appears to be a fault contact anomaly. This gradient may be a reflection of the local northern limit of the fine grained basalt interpreted from aeromagnetics.
- 3) X-15 is a suggestion of another structural contact. Possibly, this gradient marks the northern extent of one or more non-magnetic members of the post mineral section.
- 4) From 3) above it follows that the area bounded on the south by 384N and on the east by HH may have little or no capping of post mineral rocks.
- 5) An old churn drill hole located about 1800 feet north of 386N on the extension of line CC was logged basalt porphyry. This information limits the potential shallow extent of pre-mineral rock units in the northwest portion of Tract I.
- 6) Local gravity highs X-11 and X-12 are not considered economically important because of probable post mineral rock cover.

The detail coverage (intermediate lines in anomalous areas) has pointed out a small gravity high which was previously overlooked. This anomaly is labeled X-4f on the relative gravity map. The response may be due to bedrock relief. However, since this falls in an area of particular interest, a lime-silicate source should be considered.

The new coverage in Tract III is also shown on the attached map. The work was intended as a supplement to our existing knowledge of the district regional gravity.

January 7, 1958

Recommendations

A shallow hole is recommended at EE, 385.2 to test the pre-mineral rock interpretation described under 4) above.

One hole is recommended at RR, 373.3 to test the anomaly treated in paragraph 3 above.

Comments

A shallow hole has been drilled to test gravity high X-2 (recommended in memos of 10-17-57 and 12-10-57). This hole (X-227, D-366.0) reached bedrock at 134 feet. The source, then, of X-2 has probably been explained by the anomalous bedrock depth.

Any further theoretical interpretations, including possible construction of a residual gravity map, will be deferred until after my return to Salt Lake City.

W. E. SAEGERT

WES/ds

Attachment - 1" = 1000' Relative

cc: -all w/map - Gravity Contour Map

LHart
KRichard
BMorrison
JLClark
RECribbs
FEMcDonald

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 24, 1957

Mr. L. H. Hart, Chief Geologist
New York Office

DRILLING - SAN XAVIER PROJECT

Dear Sir:

Enclosed is a print of the 1000-scale drilling map on the Reservation. This map shows the results to date of the geophysical work and progress of drilling. This map will be brought up to date and reissued periodically as drilling and geophysical information of interest are developed.

Hole X203S encountered bedrock with chrysocolla in strongly altered arkosic quartzite at a depth of 152 feet. Sulphides, including a fair amount of chalcocite, were penetrated at about 170 feet. Core recovery in bedrock has been poor, and we are now moving the pull-down rig off this location with the intention of eventually deepening the hole with a hydraulic rig.

Hole X209S encountered strongly altered arkose, containing chalcocite-limonite, at a depth of 86 feet. IX casing is being set, and this hole will be drilled to depth with our regular coring procedure. The results of these two holes offer encouragement for the general area around the two outcrops in Tract 1. We expect to be clear on Tract 1 with the Bureau of Indian Affairs by September 25 and will move rigs into the area around the two outcrops promptly thereafter.

Holes X201 and X202 on the northwest extension of the East Pima ore zone have been making slow progress due to broken, leached ground, but they both now are in arkose containing moderate disseminated chalcocopyrite.

Upon closer inspection, the cores in holes X203S, X204S, and X209S represent a variety of volcanic rock types rather than the single unit basalt porphyry. This suggests a series of flows.

Those receiving copies of this map please note the alphabetical designation for north-south coordinate lines, which appear on the south edge of the map. In referring to proposed drill holes this alphabetical designation will be used in conjunction with the east-west survey coordinate lines, the numbers for which appear along the east edge of the map. Thus, the location of the proposed shallow hole east of X209S would be

September 24, 1957

YY-374, and for the proposed location west of X202 would be YY.25-365.25. When a location is drilled, the hole will be given a number in sequence with holes drilled on that tract, as explained in the note on the map.

Our information is that the union voted on September 15 to discontinue the strike. There has been no picket activity since then. Therefore, Joy will operate four deep-hole rigs on a two-shift basis beginning about September 30. Shortly thereafter they will bring in an additional rig. The two rigs drilling shallow holes will continue on a one-shift basis for the time being. Out of the total of seven rigs, one will remain in the East Pima area to drill several fringe and claim-validation locations.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

KR/ds

Attachment - Map No. 1385

cc: DJPope - w/Attachment
RJLacy - w/Attachment
WSeegart - w/Attachment

bc: JLClark - w/Attachment
JKinnison - w/Attachment

X 201
409 - 490 Brn sandy Arg East. Steep dip
490 bottom even

480 ± more cgl. cpy on top
bedding 45°
515 cgl - 70°-80°

X 202

414 - 427 Chl. mag ark like C
Pur. mine

428.9 - 429.9 Sheared? (contorted w/
gtz veins or siliceous patches) ark
(cgl?) lens color. prob K.f. cpy.

428.9 - 429.7 - 2" narrow. Chlorite
gg w/ granular frags.

429.7 - 429.7 Black and gray banded
rock. contorted - looks like ark. prob ark.
429.7 - 431.7 Same

431.7 - 432.2 fine-gr light gray,
granular surface of gtl. Same as 431.7.

432.2 - 473. Same

473 - 479 1' of coarse-gr. ark. in
"minimization" zone. brown.

474 - 530 Ark, local ark. Same as 473.
slightly gray chert like opagus. some
banded. 475? gtz veins in upper
portion possible F12 between 475

checked to 589. Arg - F12 - Ark

202

cyl to 200.0±

200 - 261 Ark

261 - 306 Ark & Arg 10-20°
sheds @ 235

306 - 354 Chl, distorted, Ark & Arg
70-80° streaks

354 - 359 Chl, calc. Ark
pebbles @ 30° 324

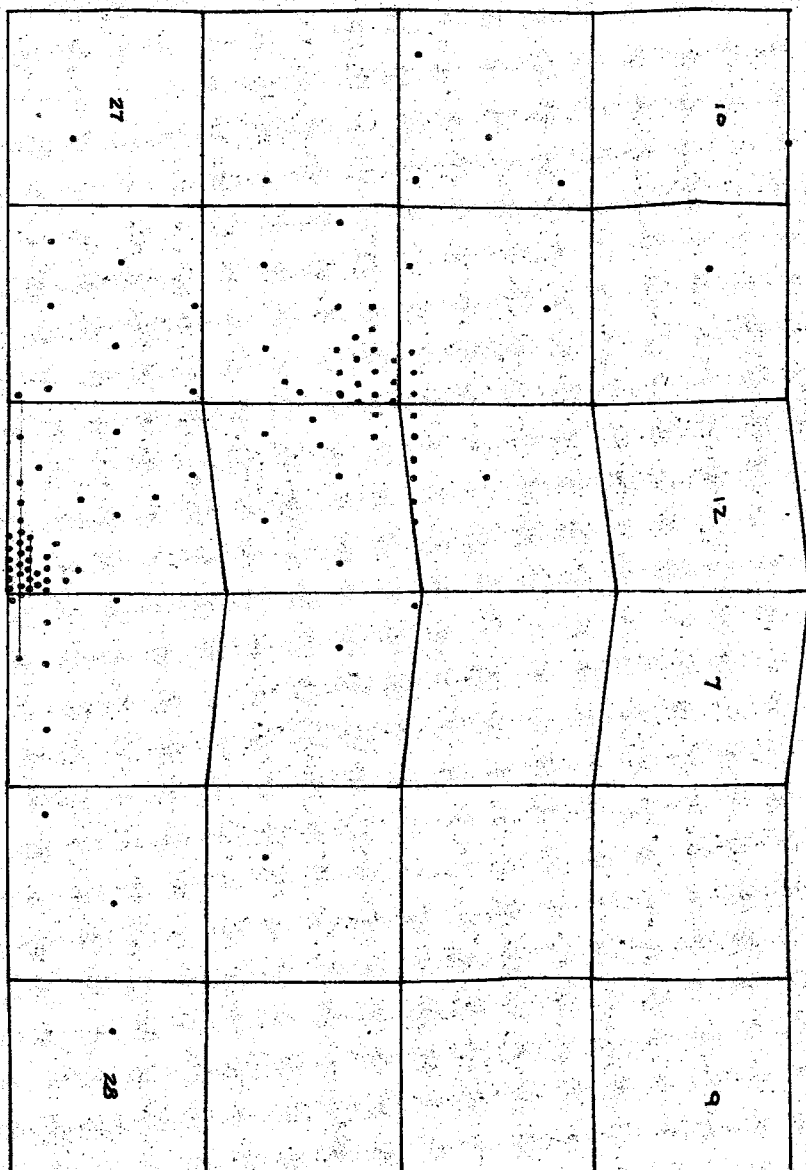
359 - 369 Tact. w/ chl, same hom.

369 - 388 Ark chlorite, sp, garnet in turn
folds in the chert.

388 - 405 Tactite. mostly, same as previous interval
much distortion and breccage

405 - Chlorite - same as above.

10/9/57



April 10, 1961

Mr. Fred Pashley
U. S. Geological Survey
Ground Water Branch
Tucson, Arizona

Dear Sir:

Attached please find geologic logs of the two holes
you surveyed with electrical equipment, on the San Xavier Re-
servation, during March of this year.

Yours very truly,

ORIGINAL SIGNED BY
JOHN E. KINNISON
JOHN E. KINNISON

Attachments
JEK/ds

SAN XAVIER INDIAN RESERVATION
ASARCO -- Partial Logs of 2 Drillholes

X 138

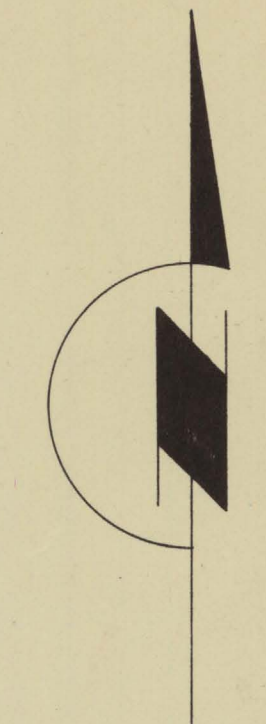
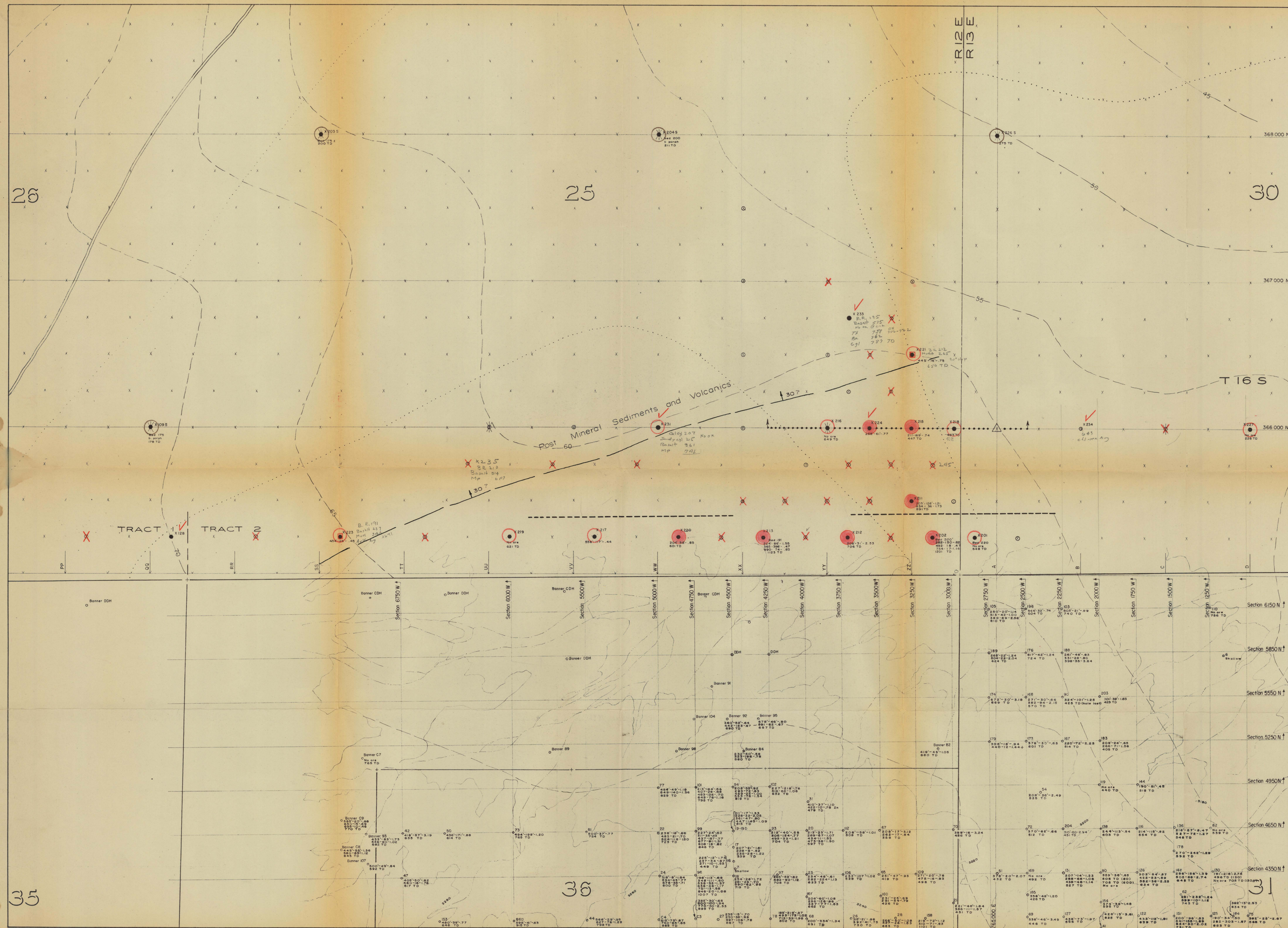
1. Located on south line of Sec. 3, at approximately the SE corner, SW 1/4, SE 1/4, Sec. 3, T16S, R12E.
2. Elev. 2930' approx.
3. Drilled with 4 3/4" Rotary drill bit. Rock identification by cuttings and occasional 4 to 5 foot diamond bit core runs.
4. Geology -- No casing in hole.

0 - 169'	Alluvium
169 - 617 ⁺ 2'	Basalt porphyry (Cooper's "turkey track" andesite)
617 - 706'	"San Xavier conglomerate beds"
706 -	Rhyolite

X 204

1. Located about 500' east of the SW corner of the NE 1/4, Sec. 25, T16S, R12E.
2. Elev. approx. 3200'.
3. Drilled to 1000' with 4 3/4" Rotary drill bit. Rock identification based on cuttings and 4 to 5' diamond core runs at about 100' intervals.
4. Geology

0 - 200'	Alluvium - 40' of 4" pipe casing at top of hole.
200-423'	approx. Basalt (Black Mountain type)
423 - 775'	approx. "San Xavier conglomerate beds" (Upper beds). Green colored to 512' ⁺ , red colored to 775'.
775 - 1207.5'	Basalt porphyry (Cooper's "turkey track" andesite). Below 1000' drilled with diamond core drill.
1207.5 -	San Xavier conglomerate beds (lower beds).



EXPLANATION

- Hole Numbering System On Reservation
Tract I — X101, X102, etc.
Tract II — X201, X202, etc.
Tract III — X301, X302, etc.
- Shallow Holes Designated X101S, etc.
- Holes Drilling X206S, etc.
- Hole Location Prepared o
- Holes To Be Drilled Next Deep Shallow X X
- Holes complete but all assays not available

- Magnetic High (Erwin letter 9-11-57)
- Relative Gravity Contours C1=0.5 milligal
- EM "Tandem" effect
- EM "Edge" effect

- Holes in post-mineral rocks only
- Holes in mineralized bedrock
- Holes in possible open pit ore

CONFIDENTIAL

TO ACCOMPANY LETTER
DATED Jan. 15, 1958
BY Kenyon, Richard

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP
SOUTHERN TRACT II
SCALE 1" = 300'
CONTOUR INTERVAL 20'



EXPLANATION

Hole Numbering System On Reservation

Tract I — X 101, X 102, etc.
Tract II — X 201, X 202, etc.
Tract III — X 301, X 302, etc.

Shallow Holes Designated X 101S, etc.

Holes Drilling • X 206S, etc.

Hole Location Prepared ○

Holes To Be Drilled Next Deep Shallow

Holes complete but all assays not available ○

Magnetic High
(Erwin letter 9-II-57)

Relative Gravity Contours
C1 = 0.1 milligal

EM "Tandem" effect

EM "Edge" effect

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP

SCALE 1" = 300'
CONTOUR INTERVAL 20'

September 1957

Map No. 1383

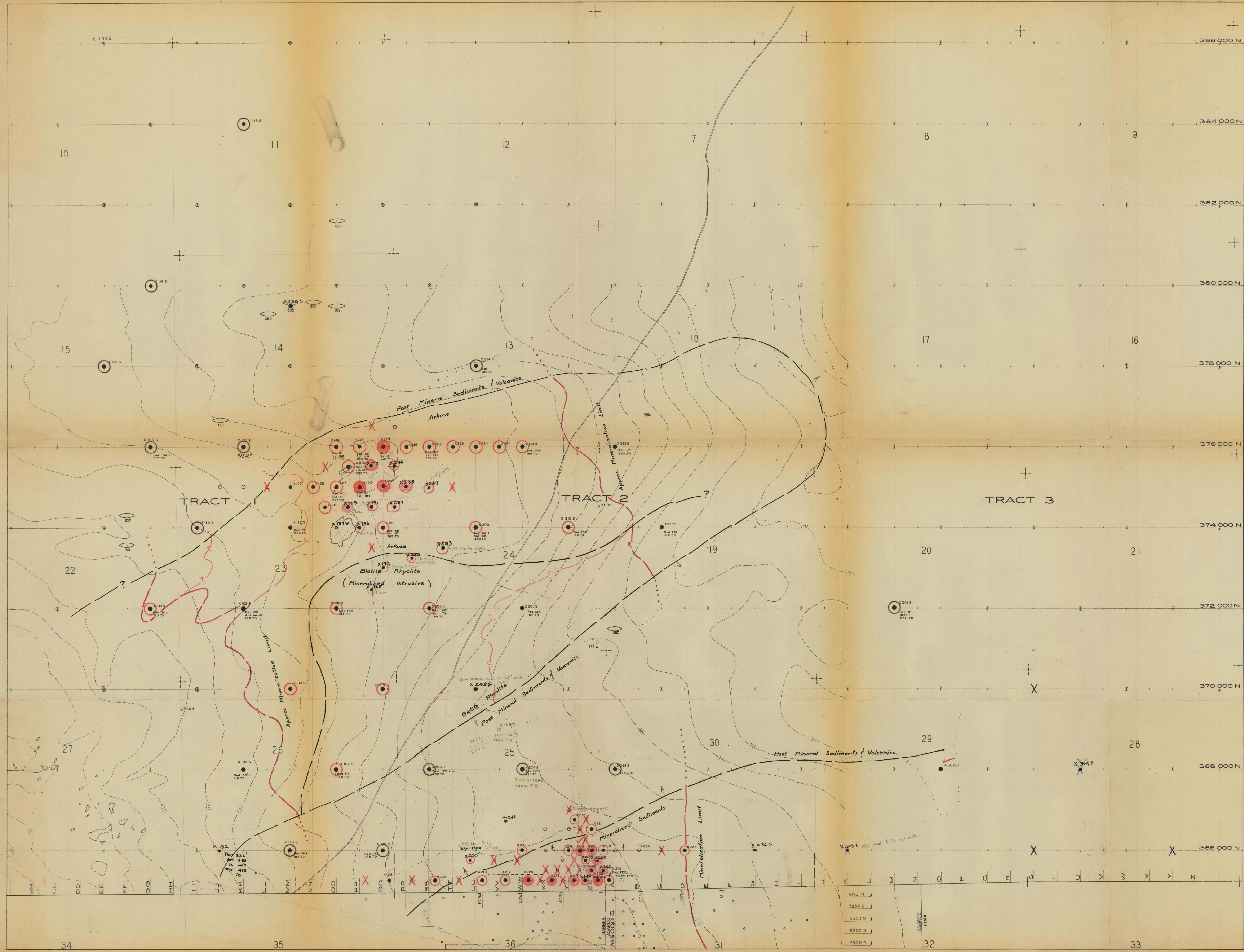


- Hole Numbering System on Reservation
- Tract I — X 101, X 102, etc.
 - Tract II — X 201, X 202, etc.
 - Tract III — X 301, X 302, etc.
- Shallow Holes Designated X 101 S, etc.
- Holes Drilling X 206 S
- Hole Location Prepared
- Holes To Be Drilled Next Deep Shallow
- Holes Complete But All Assays Not Available
- Magnetic High (Erwin Letter 9-11-57)
- Relative Gravity Contours $Cl = 0.5$ milligal (Soegart report 12-10-57)
- Hole in post-mineral rocks only
- Hole in mineralized bedrock
- Hole in possible open pit ore

CONFIDENTIAL

TO ACCOMPANY Letter
DATED Jan. 15, 1958
BY Kenyon Richard

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP
CENTRAL TRACT I-II
SCALE 1" = 300'



EXPLANATION

Hole Numbering System On Reservation
Tract I — X101, X102, etc.
Tract II — X201, X202, etc.
Tract III — X301, X302, etc.

Shallow Holes Designated X101S, etc.
Holes Drilling X206S, etc.
Hole Location Prepared o
Holes To Be Drilled Next, Deep Shallow X X

Magnetic High
(Erwin letter 9-11-57)

Relative Gravity Contours
CI = 0.5 milligal
(Sagart report 12-10-57)

EM Crossover
max. depth
EM "Tandem" effect
EM "Edge" effect

Holes in post-mineral rocks only
Holes in mineralized bedrock
Holes in possible open pit ore

CONFIDENTIAL

TO ACCOMPANY LETTER
DATED Jan. 15, 1958
BY Kenyon Richard

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP

SCALE 1" = 1000'



EXPLANATION

Hole Numbering System On Reservation
Tract I — X101, X102, etc.
Tract II — X201, X202, etc.
Tract III — X301, X302, etc.
Shallow Holes Designated X101S, etc.
Holes Drilling X206S, etc.
Hole Location Prepared
Holes To Be Drilled Next, Deep Shallow

Magnetic High
(Erwin letter 9-11-57)
Relative Gravity Contours
C1 = 0.1 milligal

CONFIDENTIAL

TO ACCOMPANY Letter
DATED Sept. 24, '57
BY Kenyon Richard

ASARCO
SAN XAVIER PROJECT
Pima County, Arizona
DRILLING MAP

SCALE 1" = 1000'
September 1957 Map No. 1385