1480 0004

(75)

PROGRESS REPORT

COW CREEK PROSPECT

Item 11

Elko County, Nevada

Divide District

Rock Creek district

CRUSON & PANSZE, Geologists

Golden, Colorado

75

Item 11

PROGRESS REPORT
COW CREEK PROSPECT
Elko County, Nevada

Divide District
Rock Creek district

By
Michael G. Cruson
Fred W. Limbach

May, 1985

CRUSON & PANSZE, GEOLOGISTS

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R49E R50E

R50E R51E

COW CREEK PROSPECT

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Tmb

(Tf)

T41N
T40N

WF

Tyv
YOUNGER
VOLCANICS

MOUNT BLITZEN CALDERA

Tf

(FELSIC FLOWS & DOMES)

Ta

GRANODIORITE

WESTERN FACIES
WF

SIXMILE PROSPECT

YOUNGER VOLCANICS
AND SEDIMENTS

T40N
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ANDESITES

ALLUVIUM

BEARD HILL

TG PROSPECT

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R49E R50E

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Figure 2

C-P PROJECT

GENERALIZED GEOLOGIC MAP

MOUNT BLITZEN CALDERA

SCALE 1: 100,000 DATE: DEC, 1982

CRUSON AND PANSZE, GEOLOGISTS

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ABSTRACT

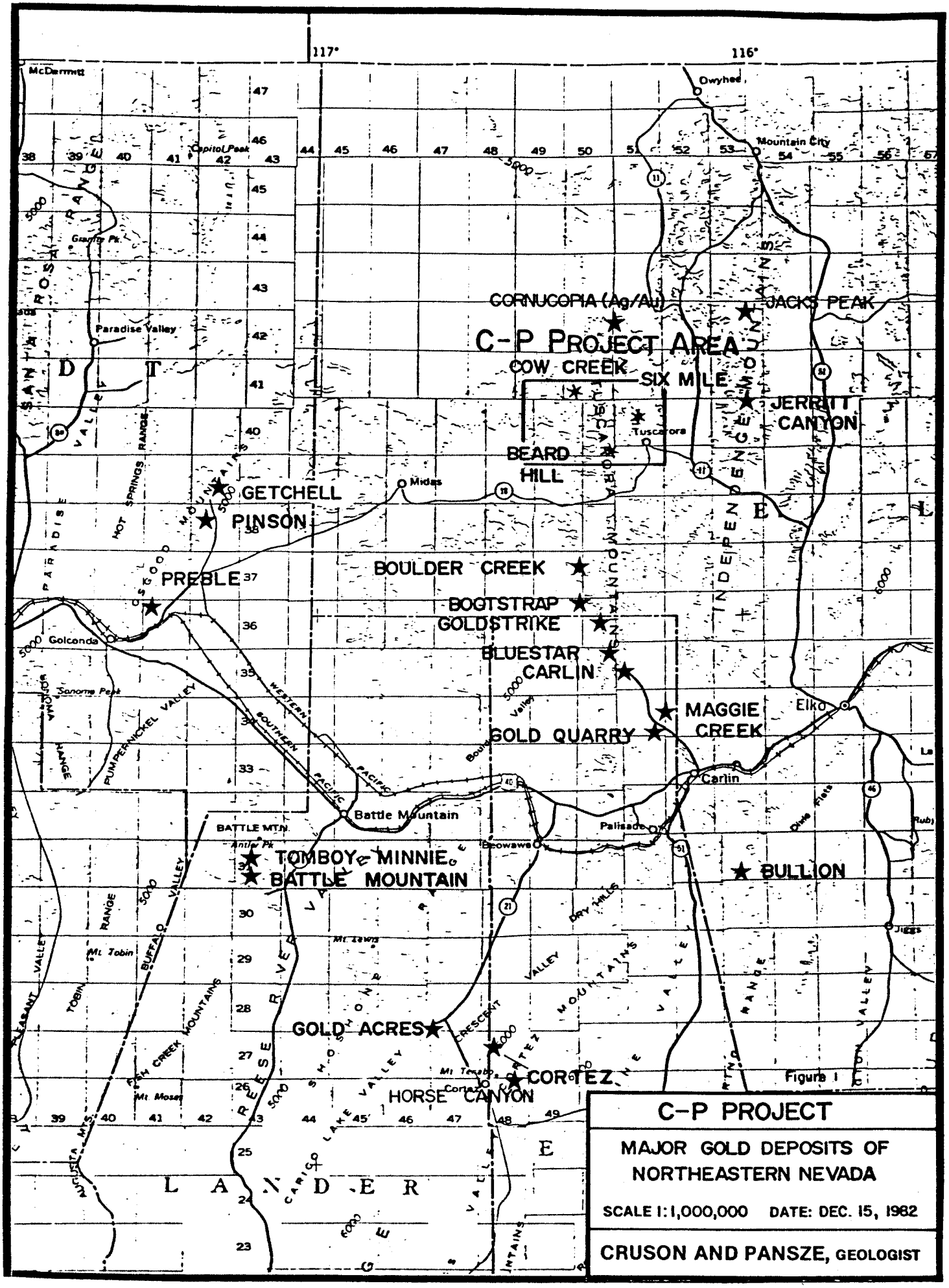
The Cow Creek prospect is located within the province of giant gold mines of northeastern Nevada. The prospect is a bulk-tonnage gold and silver target hosted by Tertiary rhyolite tuffs and Paleozoic carbonaceous sediments. Large alteration zones consist of pervasive clay, disseminated quartz-sericite, silicified veins and quartz stockworks. Massive silica and quartz breccias are present in numerous localities. Barite is common in and adjacent to veins and pyrite/marcasite, stibnite, and ruby silver are locally preserved in the massive silica. Limited soil and rock sampling has revealed large areas highly anomalous in As, Sb, Hg, Ag, and Au. Wide spread drilling has detected thick intercepts of enriched gold and silver values. Two holes encountered approximately 100 feet of ore grade gold mineralization and should be offset to test a more favorable geologic structure to the east. Detailed surface sampling followed by additional drilling is warranted in several areas throughout this huge hydrothermal system.

INTRODUCTION

The Cow Creek prospect is in northwest Elko County, Nevada (fig. 1). The prospect covers portions of sections 29 through 33, T41N, R50E, and sections 1 and 2 of T40N, R49E. The prospect consists of 162 located lode claims (CP1 through 162) on BLM-managed public domain.

The surface mineralization at Cow Creek was discovered in 1982 by Cruson and Pansze during a reconnaissance exploration program. The project (C-P Project) was funded by Shell Oil Company and covered a large area and other prospects. Shell Oil took over the Cow Creek project in early 1983 and carried out surface and subsurface exploration in the 1983 and 1984 field seasons. Early in 1985 Shell Oil relinquished all it's interest in the Cow Creek prospect to Cruson and Pansze.

The work at Cow Creek has been divided among several entities. Fred Limbach of Cruson and Pansze did the early reconnaissance mapping and sampling of the prospect. Shell hired Robert Seklemian to do the detailed surface mapping. A. J. Deaderick supervised the drilling of eleven holes on the Cow Creek prospect for Shell in 1983. Martha J. Edick-Ellis carried out the drilling of twelve additional holes in 1984. Drill hole summaries of all the holes are included in the pocket of this report.


117°
116°
McDermitt
Owyhee
Mountain City
Capitol Peak
Granite Pk.
Paradise Valley
CORNUCOPIA (Ag/Au)
JACKS PEAK
C-P PROJECT AREA
COW CREEK
SIX MILE
JERRITT CANYON
Tuscarora
BEARD HILL
Midas
GETCHELL
PINSON
PREBLE
BOULDER CREEK
BOOTSTRAP
GOLDSTRIKE
BLUESTAR
CARLIN
MAGGIE CREEK
GOLD QUARRY
Golconda
Sonoma Peak
Elko
Carlin
Battle Mountain
BATTLE MTN.
Antler Pk.
TOMBOY
MINNIE
BATTLE MOUNTAIN
Beowawe
Palisade
BULLION
Mt. Tobin
Mt. Lewis
GOLD ACRES
CRESCENT VALLEY
CORTEZ
Cortez
Mt. Moses
HORSE CANYON
LANDER
Figure 1
C-P PROJECT
MAJOR GOLD DEPOSITS OF NORTHEASTERN NEVADA
SCALE 1:1,000,000 DATE: DEC. 15, 1982
CRUSON AND PANSZE, GEOLOGIST

GEOLOGIC SETTING

Paleozoic

The Cow Creek prospect is located in the northeast-trending Cordilleran geosyncline. The geosyncline was disrupted in Devonian time by the Antler orogeny (Roberts and others, 1971). During the Antler orogeny cherts and siltstones of the "Western Facies" rocks were thrust over carbonates of the "Eastern Facies". The Cow Creek prospect lies within the transitional facies of the northeast-trending axis of the Antler orogenic belt.

Mt. Blitzen Caldera

The Mesozoic and Cenozoic geology of the northern Tuscarora Mountains is dominated by volcanism and hot springs activity. The Mt. Blitzen caldera, which is probably early Tertiary, may be the source of the voluminous ash-flow deposits that mantle this portion of Nevada (Limbach and Cruson, 1982). The Cow Creek prospect is located along the western edge of the Mt. Blitzen caldera (fig. 2).

Gold Mineralization

The Cow Creek prospect is located within the province of giant gold mines in northeastern Nevada. Countless prospects and over 20 active gold mines with nearly 20 million ounces of recoverable gold mark this region as the premier gold exploration province in the United States. Roberts and others (1971) place Tuscarora on the Shoshone-Jarbrige mineral belt and relate

this district and other major deposits to regional structures. High heat flow with associated hot springs activity is well documented throughout this region and may be the origin of relatively young precious metal deposits.

Numerous recent discoveries attest to the immature nature of exploration in this region. Figure 1 shows the Cow Creek prospect in relation to important prospects and operating mines.

GEOLOGY

The geology of the Cow Creek prospect is dominated by at least six square miles of intensely altered ash flows (fig. 3). The ash flows, which are rhyolite in composition, are partially covered by post mineral quartz latite to rhyolite flows and tuffs. Porphyritic dikes, plugs, and breccias of diverse composition outline several suspected volcanic centers.

Alteration is widespread and increases from quartz and clay on the north to widespread sericitic alteration in the southern portion of the prospect (Seklemian, 1983). Quartz stockworks are abundant throughout the project. Most of the stockworks and breccia zone are related to north-trending structures but two equidimensional stockworks may be pipelike bodies. Large silicified breccias are characterized by barite, stibnite, pyrite/marcasite, and ruby silver.

Structure of the Cow Creek prospect is dominated by a series of faults that trend north-northeast. It is unclear whether these faults are part of the ring fracture of the Mt. Blitzen caldera or later block faulting. These structures, which are not occupied by large quartz veins and stockworks, generally have a southeast dip. A noteable exception is a large quartz-barite structure on the west edge of the altered tuff that dips 45 degrees west. Two parallel, northtrending structures appear to be post mineral. The eastern most


B Barite Veining
SOIL GEOCHEMISTRY
> 160 ppm As
80 - 160 ppm As

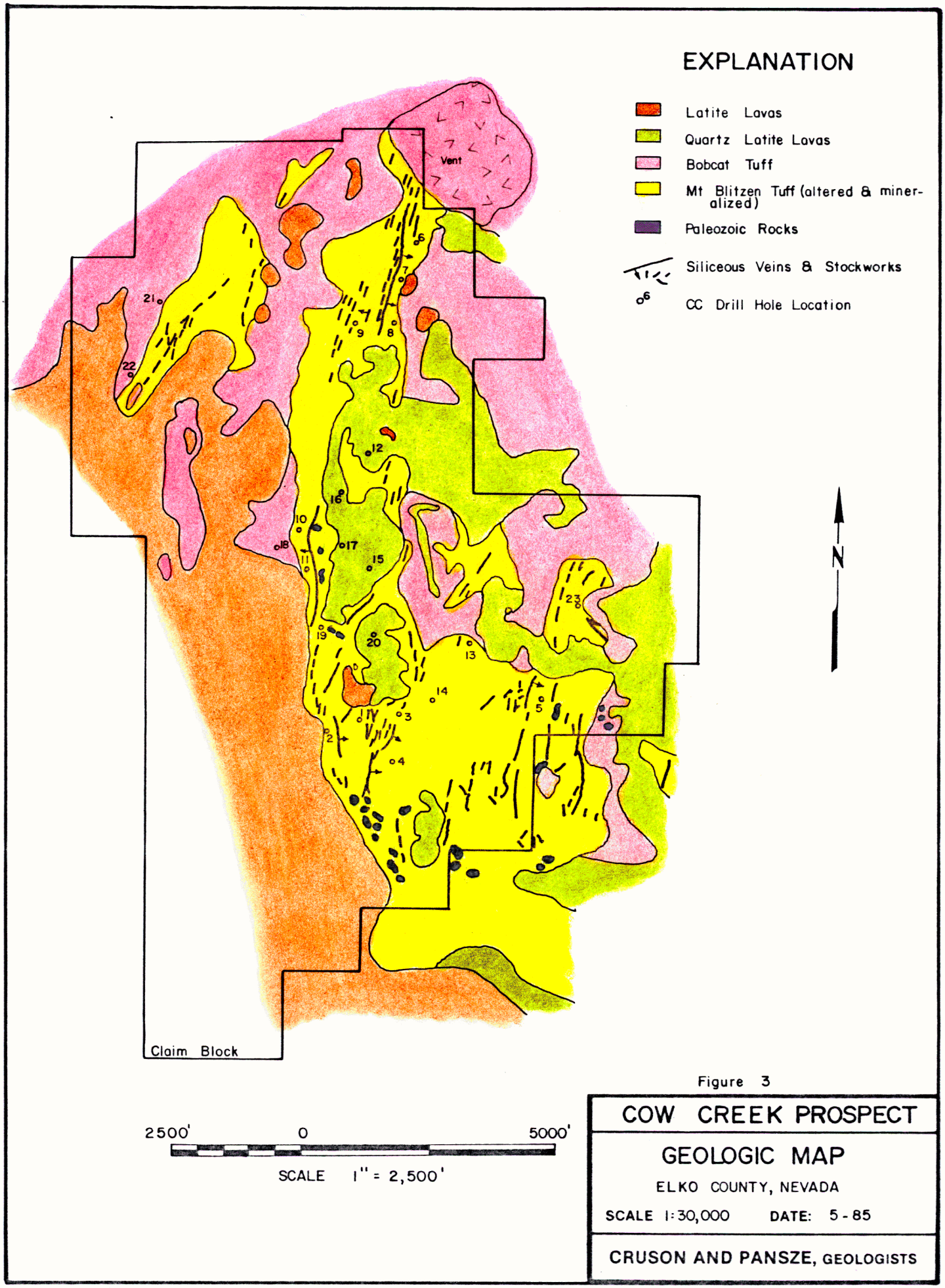


Figure 3

COW CREEK PROSPECT

GEOLOGIC MAP

ELKO COUNTY, NEVADA

SCALE 1:30,000 DATE: 5-85

CRUSON AND PANSZE, GEOLOGISTS

structure follows Red Cow Creek while the western structure is along the western contact of the altered tuff with post-mineral flows.

GEOCHEMISTRY

The Cow Creek prospect has not been adequately sampled. Approximately 55 rock-chip samples were taken on the Cow Creek prospect during the initial reconnaissance. As the claim staking took place soil samples were obtained at all corners and side centers. During the two seasons of subsurface exploration by Shell Oil Company 26 rock-chip samples and 20 soil samples were taken.

Surface rock-ship samples from silicified areas are highly anomalous in Au, Ag, As, Sb, and Hg (Table 1 and Appendix A and B). Rock samples commonly contain 1000's of ppm As, 100's of ppm Sb, and several ppm Hg. Gold is detectable in most of the samples and the highest value is 0.96 ppm. Silver is much more abundant with several samples containing 5 to 10 opt Ag. The Ag/Au ratio is normally in excess of 100 but one area in the southern portion of the claim has a Ag/Au ratio of 7 to 22. This same area has relatively low mercury content.

The soil samples show large areas with very anomalous As, Sb, Hg, and Ag. The anomalous areas are several square miles in extent and range up to 447 ppm As, 29 ppm Sb, and over 2 ppm Ag. The highest Hg anomaly (1-4 ppm) occurs around the Teapot Mercury Mine. Gold was dectected in two soil samples.

The mineralization at Cow Creek indicates a crude zoning. The zoning is concentric to the volcanic center just west of

TABLE 1

Geochemical Statistics for Rock and Soil Samples

1982 SAMPLING

	55 rock samples		385 soil samples	
Element	Mean (ppm)	Range (ppm)	Mean (ppm)	Range (ppm)
Au	0.12	0.02-0.96	----	0.02-0.06
Ag	7.3	0.3-603	0.6	0.1 -3.0
As	1,168	1-14,000	35	1-447
Sb	217	1-6,168	3	1-43
Hg	3.45	0.03-506	0.19	0.01-12.16

1983 SAMPLING

	26 rock samples		20 soil samples	
Element	Mean (ppm)	Range (ppm)	Mean (ppm)	Range (ppm)
Au	0.06	0.02-0.27	not detected	
Ag	6.7	0.4-102	0.16	0.05-0.40
As	855	215-2,000	132	10-475
Sb	679	6-11,400	12	3-34
Hg	2.30	0.14-30.3	0.08	0.05-0.18

holes 10, 11, and 18. The central part of the zone is characterized by lower Ag/Au ratios and high As and Sb. The higher silver values are peripheral to this zone. Mercury is present in the silver zone but is usually more distal. More sampling will be required to accurately delineate the mineral zoning.

EXPLORATION TARGETS

Carbonaceous Sediments

The southwestern portion of the prospect is underlain by carbonaceous siltstones. These favorable lithologies are adjacent to a huge hydrothermal system that has mineralized several square miles with As, Sb, and Hg. Low grade gold and silver is also present locally. The contact between the Paleozoic sediments and the intensely altered ash flows may be the ring fracture of the Mt. Blitzen caldera.

One Hole (CC-2) penetrated a portion of the Paleozoic section. The top 265 ft of this hole penetrated altered tuff with numerous gold shows. At 240 ft the hole encountered 25 ft of weak gold mineralization and then bottomed in 135 ft of pyritized, carbonacous siltstone. The bottom 180 ft of this hole contained 0.1 opt Ag and was increasing noteably in the bottom 50 feet.

Most of the Paleozoic sediments are covered by post-mineral tuffs and flows. However, the numerous altered siltstone blocks that have been mapped as landslide debris may be basement. No rock-chip samples were taken from the altered volcanic rocks known to overlie the siltstones. However, 8 of 9 rock-chip samples taken near the contact between the volcanic rocks and the siltstones contained gold. The southern most four samples covered an area 300 x 1000 ft

averaged 0.01 opt gold. These samples also contained hundreds of ppm Sb, thousands of ppm As, and anomalous mercury. The mercury content is lower than the surrounding area suggesting a zoning where the highest gold content coincides with lower mercury content and a lower Ag/Au ratio.

Soil samples in the vicinity of the Paleozoic siltstone are highly anomalous in As, Sb, and Hg. An area 1000 x 1000 contains over 300 ppm As and 15 ppm Sb. The mercury anomaly in the soils is offset from the arsenic and antimony and averages 0.30 ppm Hg in the sieved soil samples.

The underlying Paleozoic sediments may be tested by sampling the numerous silicified siltstones in the southwest portion of the claim block. Drilling an eastern offset to CC-2 would test the Paleozoic sediments where there is better structural preparation and surface geochemistry.

Moderately Welded Tuff

Holes 10 and 11 each penetrated 100 ft of moderately welded tuff that contained 0.02 opt gold. These holes were drilled to test a west dipping structure with abundant barite and silica with low level gold and silver content. The structure, which was intercepted at 50 ft, contained only trace amounts of gold and silver. The structure is the feeder system for the mineralization in the unwelded zone. The principal target is where the unwelded zone is adjacent to the structure.

The surface mineralization is all to the east of the holes 10 and 11. A soil anomaly contains up to 150 ppm As, and 5 ppm Sb. Five rock chip samples of the structure are tabulated below:

Sample No.	As	Sb	Hg	Ag	Au(ppm)
FR30	466	46	3.49	1.9	.10
FR86	2136	98	1.43	1.3	.09
RX5951	650	39	1.05	2.3	---
FR31	2186	17	0.26	1.1	---
RX5949	850	52	1.85	1.2	---

Hole 18 was drilled between 10 and 11 but 300 ft west. The hole encountered the structure at 220 ft where low grade gold (0.00X opt Au) and silver (1-2 ppm) mineralization was present over 65 feet. The massive silica and barite of the silica cap were not reported in the cuttings some 150 ft deeper

where precious metal values increased. The compaction layering in the ash flow tuffs dip 32° west indicating that the mineralized unwelded zone in hole 10 was not intercepted by holes 17 or 18. Hole 17, which was spudded 800 ft east and 200 ft vertically below the collar of hole 10, is east of the surface projection of the mineralized zone. No sampling has been done in the area where the zone projects to the surface.

North Zone

The North Zone, which lies west of holes 6, 7, and 8 is of at least one square mile in size and consists of quartz stockworks and massive silica zones. The window exposing intensely altered lithic tuffs beneath post mineral flows is marked by abundant "hot springs" indicator elements and low level gold and silver mineralization. The thick (100 to 250 ft) silica cap with traces of precious metals may overlie a major precious metals deposit.

The soils overlying the North Zone are strongly anomalous in arsenic and antimony. The central portion of the soil anomaly is 1000 by 1500 ft and contains over 400 ppm arsenic and ten's of ppm antimony.

The sparse rock chip sampling confirmed the anomalous soil samples. Only thirteen rock chip samples were taken but all are strongly anomalous in arsenic, antimony, mercury, and silver. Four of the rock chip samples contained gold with the highest being 0.03 opt gold. Arsenic content of the rocks is commonly

in the thousands of ppm. The antimony content is in ten's to hundred's of ppm with a high of over 5000 ppm Sb. Almost all the mercury analyses show several ppm. The silver content is normally a few tenth's of an ounce with a maximum of approximately 4 ounces of silver per ton.

Four vertical rotary drill holes tested a portion of the North Zone in 1983. Three of the holes (6, 7, and 8) were drilled on an east-dipping structure along the east side of the surface alteration. The fourth hole (9) was drilled to test a structural intersection south of the known surface mineralization. Low level silver mineralization associated with a shallow, massive silicified zone were encountered in the subsurface (Deaderick, 1983).

An excellent drill target exists just to the northwest of holes drilled to date. This area is partially covered but contains known gold mineralization and the highest concentration of "hot springs" elements in both soil and rock chip samples. A thorough sampling program and detailed geologic mapping would better focus the drilling to test this large target. Geophysics might be utilized to look beneath the post-mineral volcanic cover.

Volcanic Centers

Three or possibly four volcanic centers in the Cow Creek prospect are attractive exploration targets. The volcanic centers are well developed plumbing systems that controlled

the later hydrothermal solutions. The volcanic centers are complex with numerous post mineral intrusions and flows. The individual volcanic centers are defined by quaquaversal or centripetal flow layering or compaction features, intrusive activity, and the overall complexity of the area.

The best documented volcanic center at Cow Creek is just west of holes 10 and 18. This area is partially covered with post mineral flows but several intrusive rocks may be present. The steep dips in the vicinity of barite and pyrite mineralization to the northwest may be a part of this center. Holes 21 and 22 tested the northwest portion of the volcanic center. Hole 18, with its 400 ft of low grade gold mineralization, is interpreted to be on the east edge of the center.

Holes 1, 2, 3, and 14 form a fence across a volcanic center in the central portion of the prospect. Hole 4A is on the southern edge of this feature. Holes 2 and 4A intersected thick intervals of low grade precious metal mineralization. While hole 4A had almost complete massive silica replacement from the surface to TD at 460 ft almost no gold was present and only a few ppm silver. Hole 4A is easily the best sample of nearly complete replacement of tuff over hundreds of ft. Highly anomalous values of As, Sb, and Hg are present in the surface rocks and soils. Gold was detected in 6 of 7 select rock chip samples taken in the area. Four of the same samples were anomalous in silver.

An area of anomalous silver mineralization in the eastern portion of the claim block may be a volcanic center. An area 1800 x 1000 ft has been tested by four rock chip samples that average over 3 opt silver. Gold is also present with very anomalous As, Sb, and Hg. Holes 5 and 23 bracket the best surface mineralization but were 2000 ft apart.

An area 1000 x 1500 ft in the highly altered, southern portion of the claim block may be a volcanic center. The core of the area is underlain by a post mineral autobrecciated quartz latite. Altered siltstones with abundant barite and pyrite is more distal. Four rock chip samples over an area 500 x 1500 average 0.01 opt gold with a low mercury content. Antimony and arsenic are very anomalous in all samples. Silver anomalies are zoned outside the higher gold values. Silver to gold ratios are 7 to 22 in the central portion of the area but increase to over 100 away from the low mercury, high gold zone. No drilling or detailed sampling and mapping have been done in this anomalous area at the south end of the claim block.

Mercury Mine. The old Teapot Mercury Mine merits continued evaluation. This mine has a recorded production of 26 flasks of mercury (Bailey and Phoenix, 1944) and has had several generations of mercury exploration. Rock and soil samples contain up to 506 and 4 ppm Hg, respectively. Only 2 rock chip samples were taken over the one square mile of alteration and mineralization. These samples were anomalous in silver, arsenic, and antimony, as well as mercury.

CONCLUSIONS

1. Crude grid drilling did not adequately test the large area.
2. Surface mapping alone is not a satisfactory technique for locating drill holes.
3. Five rock-chip samples per square mile and soil samples on claim corners and side centers are not adequate to focus subsurface exploration.
4. The Paleozoic sediments are an excellent host for gold mineralization and should be thoroughly evaluated.
5. The volcanic rocks host much of the mineralization and should be studied in detail.

RECOMMENDATIONS

1. Detailed mapping and extensive geochemical sampling should be carried out to focus continued subsurface exploration.
2. The thick mineralization in the unwelded zone of holes 10 and 11 should be offset to the east.
3. The large mineralized area at the north end of the property (the North Zone) should be tested by drilling 4 to 6 holes.
4. Hole 18 should be offset to the west to test the intersection of the thick mineralized unwelded zone with the quartz-barite fault.

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APPENDIX A

Rock Sample Descriptions

FR-18 Latite tuff, (?) altered, argillized, weakly silicified, 5% vfg diss py, tr cinnabar

FR-19 Latite tuff, argillized, dump sample, shear in shallow shaft trends N33W, 70NE

FR-20 Brecciated qtz latite tuff, cemented by quartz, cockscomb texture, mod limonite, vein trends N10E, 80SE

FR-21 Vein material, silica, 5% diss py and bladed marcasite, jarosite, dump sample, vein trends N15W, 80SW, caved adit

FR-22 Vein material, dump sample, description similar to FR-21

FR-23 Vein material, several stages of quartz veining, tr stibnite, 5% marcasite - pyrite, short adit, shear trends N10W, vertical

FR-24 Vein material, several stages of quartz veining, tr cinnabar, tr stibnite, 5% bladed marcasite, minor limonite, dump sample from short adit, vein N25E, 70SE

FR-25 Vein material, quartz cutting argillized qtz latite, vein has tr stibnite, 5% marcasite, mod limonite and jarosite, outcrop, qtz vein 8" wide, vein N15E 68NW

FR-26 Vein material, qtz vein with several stages of veining, no visible sulfides, outcrop

FR-27 Vein material, oxidized, no sulfides, limonite and jarosite, vein 16" wide, N10E 85SE, outcrop

FR-28 Vein material, silica, outcrop, tr py, oxidized, limonite and jarosite, vein N15E 73SE

FR-29 Brecciated and quartz veined qtz latite ash flow, moderate limonite and jarosite, 2-5% pyrite, several stages of quartz veining, outcrop

FR-30 Quartz vein material, outcrop, no sulfides moderate limonite and jarosite

FR-31 Brecciated and quartz veined qtz latite (?) tuff, moderate limonite and jarosite, no sulfides, outcrop

FR-32 Outcrop sample, silicified shear zone, lithic-rich, qtz latite-rhyolite tuff, 1-3% marcasite, qtz veinlets, partly oxidized, mod limonite and jarosite

FR-33 Float sample, brecciated Paleozoic qtzite, dk grey, silicified, no sulfides, mod limonite, weak quartz veining

FR-34 Dump sample, high grade material, qtz vein, 1-3% pyrite-marcasite, mod limonite and jarosite

FR-35 Sample from adit, quartz latite-rhyolite tuff, senicitized, 1-3% finely diss pyrite, traces gypsum, strong limonite and jarosite

FR-36 Outcrop sample, silicified shear zone N30W, 70NE, Paleozoic qtzite, qtz veining, tr pyrite and barite, weakly silicified, weakly oxidized

FR-37 Dump sample, qtz vein material, 5 ft. deep prospect pit, vein in qtz latite-rhyolite tuff (sericitized and silicified), tr stibrite and pyrite, strong limonite

FR-38 Dump sample, high grade qtz material in qtz latite-rhyolite tuff, prospect shaft 20' deep, 1-3% pyrite-marcasite

FR-39 Outcrop sample, qtz latite-rhyolite tuff, oxidized, strong limonite and hematite, may be brecciated, weakly silicified

FR-40 Outcrop sample, silicified qtz latite rhyolite tuff, oxidized, strong limonite and hematite, tr pyrite, qtz veining trends N65E, vert

FR-64 Outcrop, Tmb, silicified, qtz veinlets, mod lim and jarosite, tr ruby silver

FR-65 Dump Tmb, qtz veinlets, barite, 1-3% py, mod lim

FR-66 Outcrop, WF breccia, mod lim

FR-67 Dump, Tmb, qtz vein 1-2% diss py, tr barite, mod lim and jarosite

FR-68 Outcrop, barite vein, mod lim and hem

FR-69 Outcrop, Tmb, qtz veinlets, veining trends N22E, 64 SE, 1-3% py

FR-70 Outcrop, Tmb, qtz vein, tr jarosite, mod lim

FR-71 Outcrop, Tmb, silicified, strong lim

FR-72 Similar to FR-71

FR-73 Dump, qtz vein in Tmb, tr ruby silver, 1-3% FeS_2

FR-74 Outcrop, similar to FR-73

FR-75 Dump, qtz vein in Tmb, vein trends N22E, 47 SE, 5% FeS_2, 1-2% stibrite

FR-84 Dump, qtz vein material, 2-5% FeS_2, dense qtz

FR-85 Outcrop, Tmb, silicified, mod FeO_x

FR-86 Outcrop, biotite latite porphyry, flow breccia

FR-87 Outcrop, barite vein, spec hem

AR-14 Outcrop, silicified Tmb, slickensides, mod FeO_x

JR-70 Light grey, moderately argillicly and silicicly altered Tmb with quartz veinlets, general rock type sample

JR-71 Same as JR-70

JR-72 Moderately argillicly and siliceously altered Tmb.

JR-73 As above, with drusy quartz on fractures and minor iron oxide staining.

JR-74 Iron oxide stained, very argillicly altered Tmb, from prospect.

JR-75 Iron oxide stained, siliceous vein material with 2.3% visible pyrite, from prospect.

JR-76 Intensely iron oxide stained, moderate argillic and silicic Tmb.

JR-153 Silicified, iron oxide stained Twb.

JR-154 Heavily iron oxide stained, argillically and siliceously altered Tmb with quartz stringer. Select outcrop sample.

JR-155 Argillically altered Tmb with heavy iron oxide staining on quartz veinlets.

JR-156 Jasperoidal (?) WF fault breccia. Secondary silica minor iron oxide staining, general outcrop sample.

JR-157 Heavily iron oxide stained, slightly silicified argillically altered Tmb. Select sample from outcrop.

JR-158 Silicified WF from structure. General outcrop sample.

JR-159 Material from siliceous vein in argillically altered, limonitically stained, Tmb. Select sample from prospect.

RX 5784	Outcrop of intensely silicified rhyolite tuff, 5% pyrite, minor sericitie and clay
RX 5785	Outcrop of breccia structure in Mount Blitizen tuff, extensive silicification of host, multiple healing of breccia
RX 5786	Outcrop of silicified Mount Blitzen tuff, pyrite and stibnite present, argillic alteration
RX 5787	Outcrop of silicified fracture zone in Mount Blitzen tuff, 2-3% pyrite, late comb quartz filling
RX 5788	Outcrop of silicified fracture vein in Mount Blitzen tuff, 2% pyrite, barite
RX 5789	Outcrop of oxidized massive sulfide veinlet, 20% pyrite, massive vein with secondary comb veining
RX 5790	Outcrop of fault gouge, blue-grey clay, abundant pyrite
RX 5791	Dump sample of silicified structure in Mount Blitzen tuff, massive 10-15 ft silica with comb quartz, very abundant sulfides, minor stibnite
RX 5792	Channel sample along road cut, ferrugirous conglomerate in creek, highly oxidized
RX 5938	Chip channel sample of siliceous vein with some argillicly altered Mount Blitzen tuff
RX 5939	Chip channel sample of siliceous vein with stockwork in Mount Blitzen tuff
RX 5940	Chip channel sample of siliceous vein with altered Mount Blitzen tuff
RX 5941	Similar to 5940
RX 5942	Similar to 5940
RX 5947	Similar to 5940
RX 5948	Similar to 5940
RX 5949	Similar to 5940
RX 5950	Similar to 5940
RX 5951	Similar to 5940

RX 7019	Chip channel sample of totally silicified Mount Blitzen, minor breccia
RX 7020	Chip channel sample of fractured and argillic altered Mount Blitzen tuff and brecciated silver veins
RX 7021	Chip channel sample of Mount Blitzen tuff, silicified with secondary veins
RX 7022	Chip channel sample of brecciated and silicified vein in Mount Blitzen tuff, abundant iron oxide
RX 7023	Chip channel sample of pervasively silicified Mount Blitzen tuff, minor marcasite
RX 7024	Chip channel sample of siliceous vein, disseminated marcasite
RX 7025	Chip channel sample of fractured and altered Mount Blitzen tuff, disseminated marcasite

APPENDIX B

Rock Sample Results

2[illegible] Quail Street, Suite 1
Lakewood, Colorado 80215
(303) 232-8371

ANALYTICAL REPORT

Page 3

Mr. Fred W. Limbach
Cruson and Fansze
1019 8th St., #300
Golden, CO 80401

PO #
PROJECT
C-F

SAMPLE NUMBER	FPM AG	FPM AG	FPM AS	FPM SB	FPM AU	FPM HG
FR-18		0.9	18	2	<.02	396.0
FR-19		1.2	21	<1	<.02	506.0
FR-20						
FR-21		1.4	1859	50	<.02	0.11
FR-22		2.3	8165	65	0.10	0.10
FR-23		2.4	2610	74	<.02	1.12
FR-24		22.5	1.4%	304	0.03	0.22
FR-25		603.0	1848	277	0.96	0.64
FR-26		3.8	1105	5017	0.18	4.40
FR-27		1.9	1219	202	<.02	7.85
FR-28		0.9	216	37	<.02	3.74
FR-30		118.9	3860	133	0.25	3.14
FR-31		1.9	466	46	<.02	3.49
FR-29		1.1	2186	17	<.02	0.26
FR-32		19.5	1752	83	0.10	5.12
FR-33		5.9	5232	92	0.26	0.12
FR-34		1.3	87	5	<.02	0.22
FR-35		5.5	6540	120	0.29	0.03
FR-36		2.0	2627	12	0.27	0.03
FR-37		26.3	1079	32	<.02	1.65
FR-38		17.8	3979	6168	0.19	0.13
FR-39		3.7	3335	80	0.10	1.50
FR-40		1.0	2780	248	<.02	29.64
		6.1	1679	162	0.04	2.85
FR-64		100.9	143	36	0.04	4.7
FR-65		2.7	2509	57	0.07	0.4
FR-66		0.3	9	<1	<.02	0.0
FR-67		6.0	424	1053	<.02	8.49
FR-68		0.7	1151	348	<.02	13.58
FR-69		0.8	376	83	0.03	6.98
FR-70		2.9	251	74	0.18	3.14
FR-71		0.9	894	16	0.06	0.23
FR-72		2.0	1443	19	0.06	0.74
FR-73		301.0	2010	185	0.20	1.52
FR-74		30.6	907	103	0.15	1.62
FR-75		49.4	696	4777	0.06	5.70
FR-84		1.7	764	50	<.02	0.04
FR-85		11.6	344	607	<.02	4.75
FR-86		1.1	8	1	<.02	0.05
FR-87		1.3	2136	98	0.09	1.43
FR-14		1.0	47	17	<.02	1.94

CONE GEOCHEMICAL INC.
810 Quail Street, Suite I
Lakewood, Colorado 80215
(303) 232-8371

Job 3180
13-Aug-82
Page 1

ANALYTICAL REPORT

Mr. Fred W. Liebach
Cruson and Pansze
1019 8th St., #300
Golden, CO 80401

PO #
PROJECT
Shell

SAMPLE NUMBER	PPM AG	PPM AS	PPM SB	PPM AU	PPM HG
JR-70	0.7	3	<1	<.02	0.04
JR-71	0.8	1	<1	<.02	0.06
JR-72	0.7	4	<1	<.02	0.08
JR-73	0.6	1	1	<.02	0.03
JR-74	3.5	373	12	<.02	25.98
JR-75	7.6	725	11	0.36	0.35
JR-76	309.0	1349	338	<.02	18.14
JR-153	0.6	34	5	<.02	0.91
JR-154	0.8	536	56	<.02	5.32
JR-155	1.2	40	6	<.02	0.09
JR-156	0.9	1583	119	<.02	5.98
JR-157	1.0	470	12	<.02	0.08
JR-158	4.1	1719	31	0.03	0.37
JR-159	1.7	682	55	0.05	0.80

	Ag ppm	Au ppm	As ppm	Sb ppm	Hg ppb
D-1	20.5	<.02	1,500	50	7,500

ITEM	SAMPLE NO.	Au (ppm)	Ag (ppm)	As (ppm)	Sb (ppm)	Se (ppm)
1	CC #1	.08	1.4	1850.	48.	2.

COW CREEK PROJECT
ELKO COUNTY, NEVADA
1983 SURFACE GEOCHEMICAL
DATA SUMMARY SHEET

SAMPLE NUMBER	SAMPLE COORDINATES EAST (X)	NORTH (Y)	GEOCHEMICAL ANALYSES (PPM) Au	Ag	As	Sb	Hg (ppb)	Cu	Pb
RX 5784	281,693.7	2,414,474	-.05	0.5	240	69	7,600		
RX 5785	281,770.1	2,415,939	0.17	25.8	+1,000	68	295		
RX 5786	279,207.1	2,415,244	0.05	10.0	950	3,900	1,155		
RX 5787	279,535.6	2,418,949	0.24	2.7	+1,000	150	165		
RX 5788	281,756.2	2,417,841	0.27	3.2	950	61	140		
RX 5789	278,339.8	2,420.353	0.05	0.5	+1,000	33	30,250		
RX 5790	279,760.3	2,419,169	-.05	1.6	475	15	465		
RX 5791	282,110.2	2,419,451	0.05	104.0	250	11,400	1,275		
RX 5792	279,555.6	2,419,109	-.05	0.4	400	6	250	18	29
RX 5938	280,285.2	2,417,667	0.05	1.2	1,375	32	230	12	4
RX 5939	280,336.6	2,417,832	0.10	1.2	900	55	985	17	5
RX 5940	279,479.6	2,418,179	0.10	1.8	1,375	30	3,150	8	4
RX 5941	279,651.1	2,418,357	0.05	0.6	950	46	275	10	4
RX 5942	280,693.4	2,418,619	-.05	0.7	215	9	1,425	12	2
RX 5947	283,327.1	2,419,061	-.05	1.6	215	23	535	33	14
RX 5948	283,262.1	2,419,057	-.05	1.1	400	24	305	25	16
RX 5949	278,772.5	2,421,500	-.05	1.2	850	52	1,850	29	12
RX 5950	280,337.4	2,418,512	0.05	0.7	850	33	700	39	7
RX 5951	278,631.6	2,422,576	-.05	2.3	650	39	1,050	48	9
RX 7019	279,394.5	2,426,485	-.05	0.6	250	25	460	53	13
RX 7020	279,513.9	2,426,404	-.05	2.2	1,125	29	1,400	37	10
RX 7021	279,050.4	2,426,582	-.05	1.2	950	51	755	36	10
RX 7022	279,676.7	2,426,732	-.05	1.4	850	54	2,200	34	12
RX 7023	279,723.6	2,426,967	0.05	2.6	950	33	2,100	41	7
RX 7024	279,807.0	2,427,361	-.05	1.4	1,125	40	640	34	11
RX 7025	279,946.5	2,427,895	-.05	2.7	425	19	1,450	63	7

APPENDIX C

Drill Hole Summaries

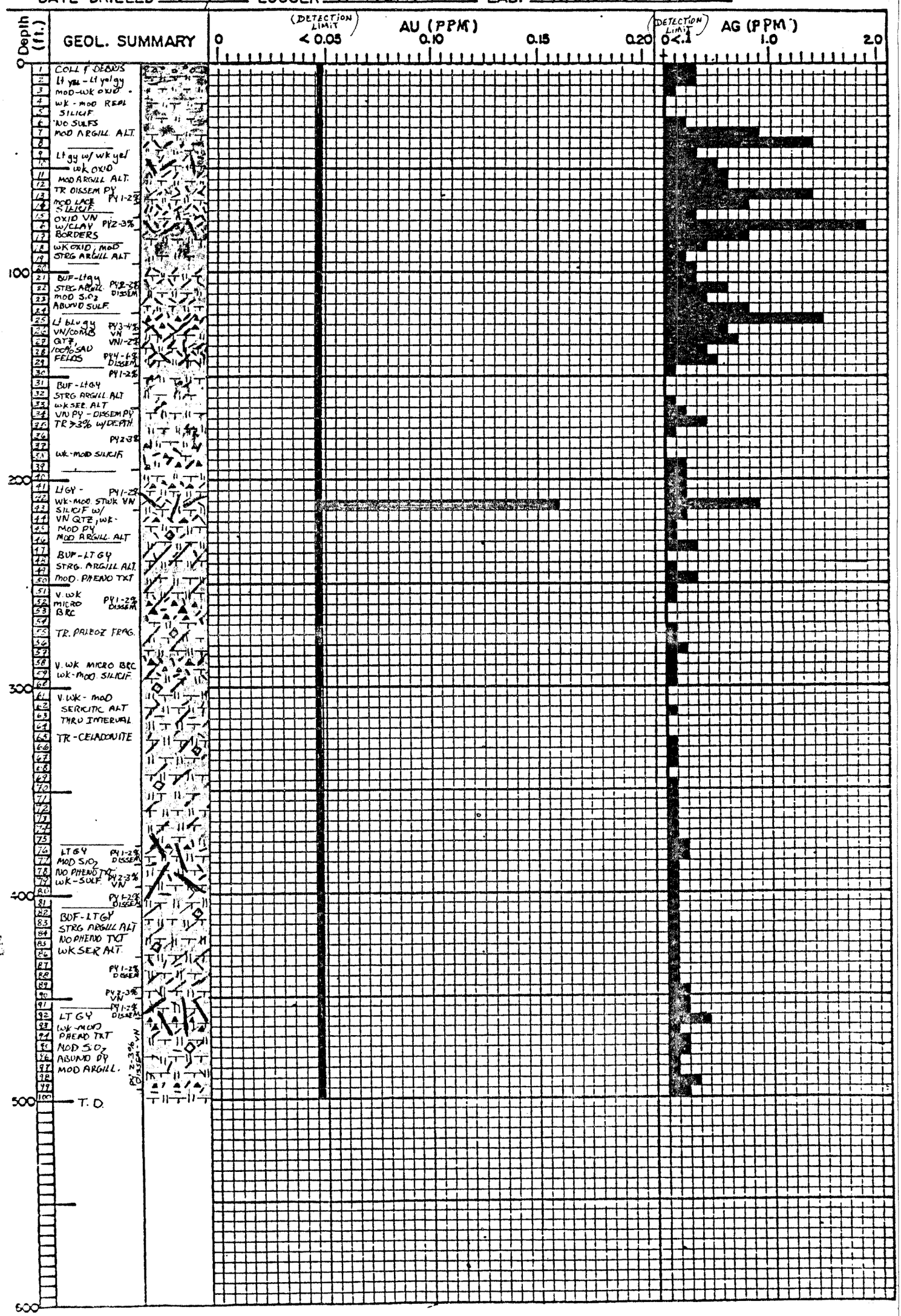
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-1

PROPERTY COW CREEK (CP) STATE NEVADA COUNTY ELKO SECTION SE ¼ 1 T. 40N R. 49E

DATE DRILLED 8/2/83 LOGGER A. J. DEADRICK LAB. MINITOR Labs.



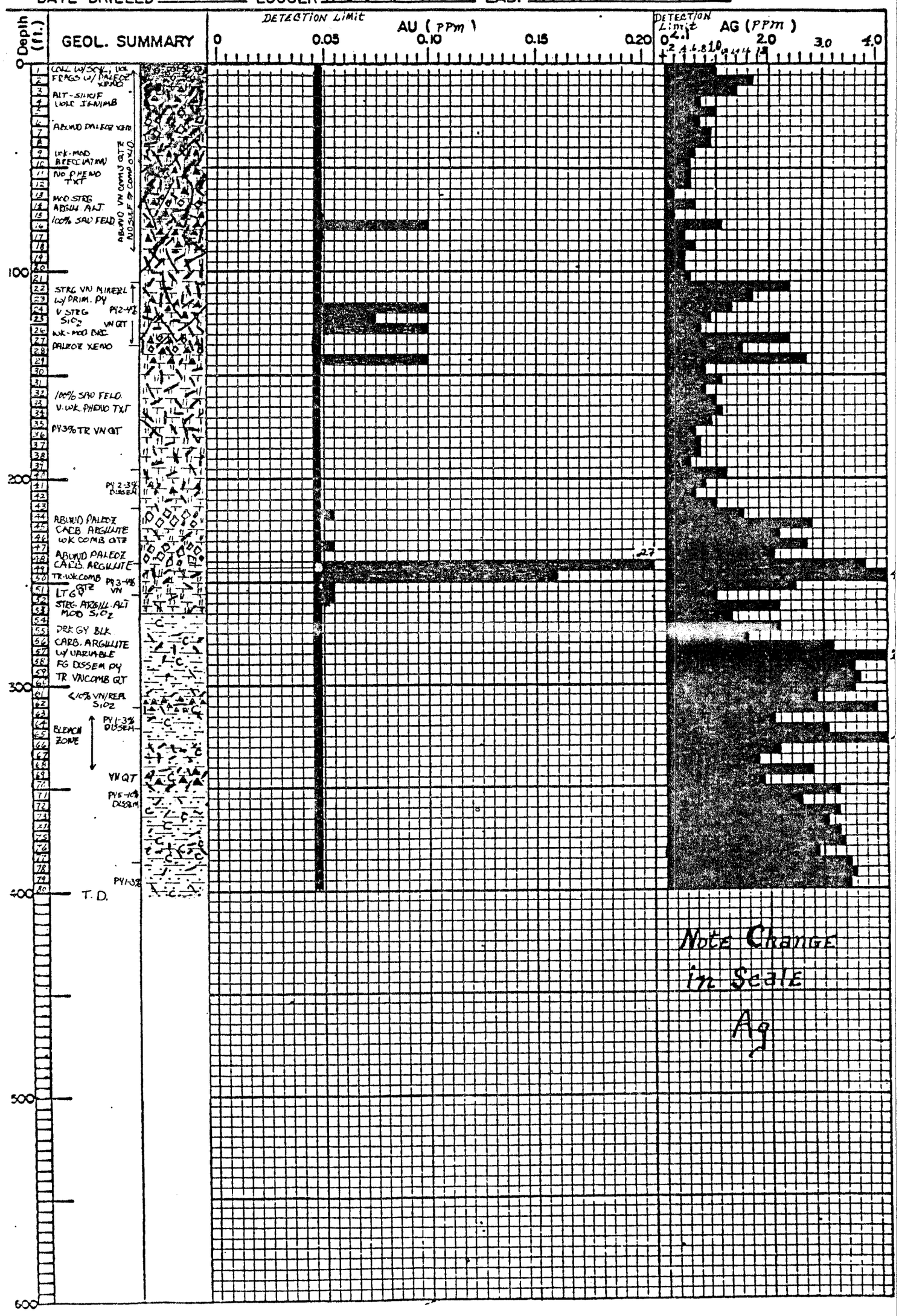
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-2

PROPERTY Cow Creek (C-P) STATE Nevada COUNTY Elko SECTION SE¼NW¼ 1 T. 40N R. 49E

DATE DRILLED 8-3-'83 LOGGER A.J. Dederick LAB. Monitor Labs.



Note Change in Scale Ag

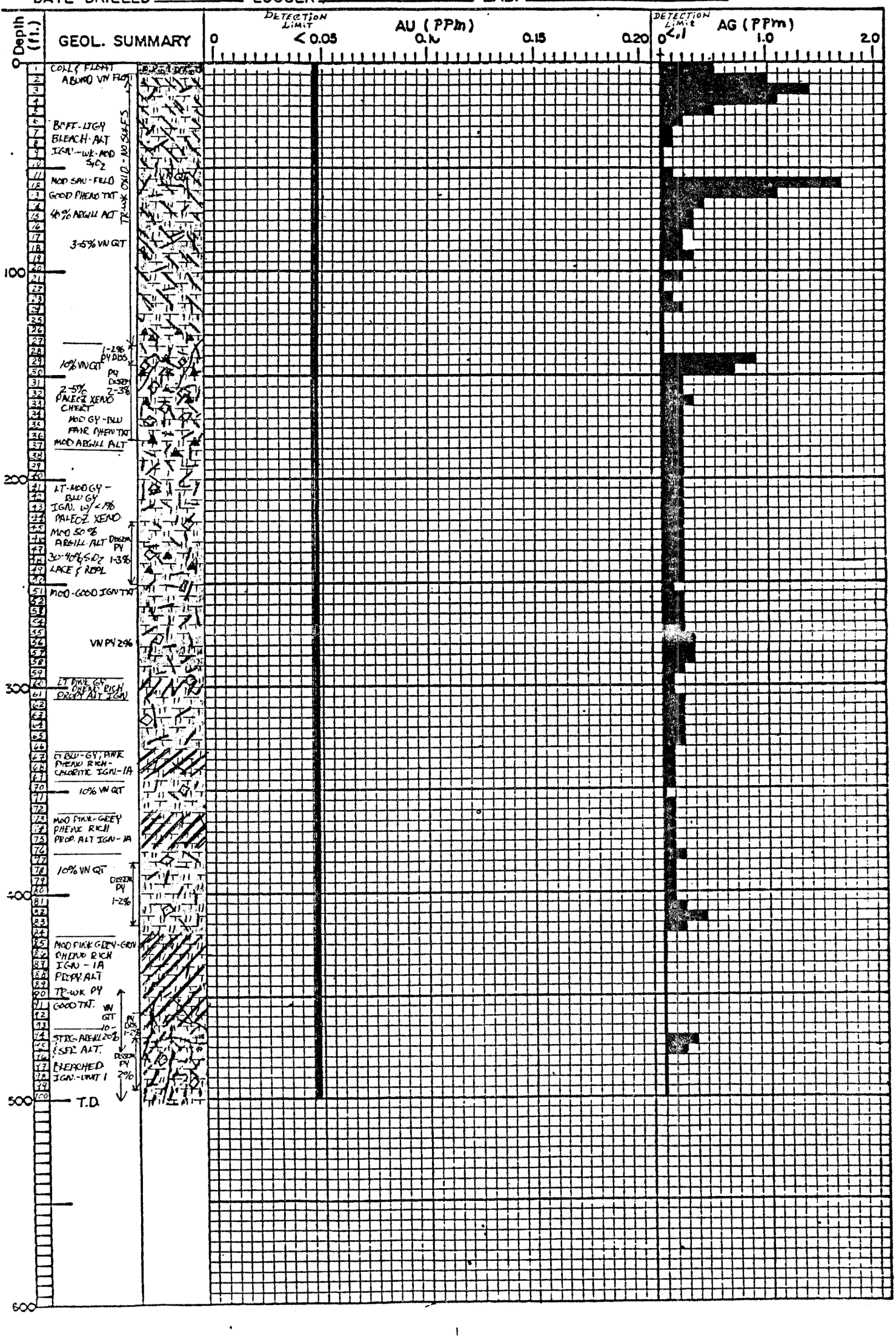
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-3

PROPERTY Cow Creek (C-P) STATE NEVADA COUNTY ELKO SECTION SE/NW 11 1 T. 40N R. 49E

DATE DRILLED 8-5-83 LOGGER A. J. DEADERICK LAB. MONITOR LABS



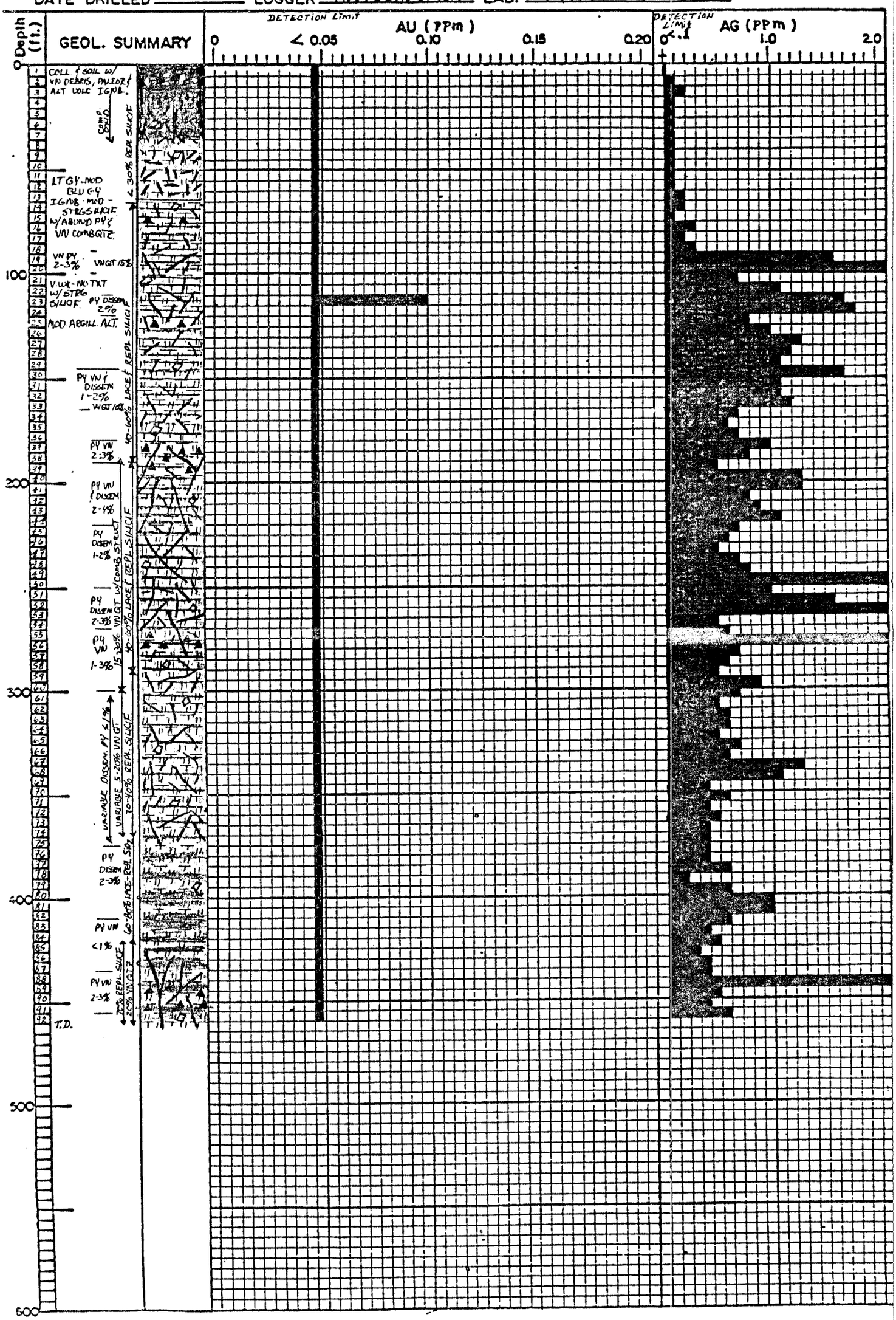
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC 4A

PROPERTY COW CREEK (C-P) STATE NEVADA COUNTY ELKO SECTION SE¼ NW¼ 1 T. 40N R. 49E

DATE DRILLED 8-8-83 LOGGER A.J. DEADERICK LAB. MONITOR LABS



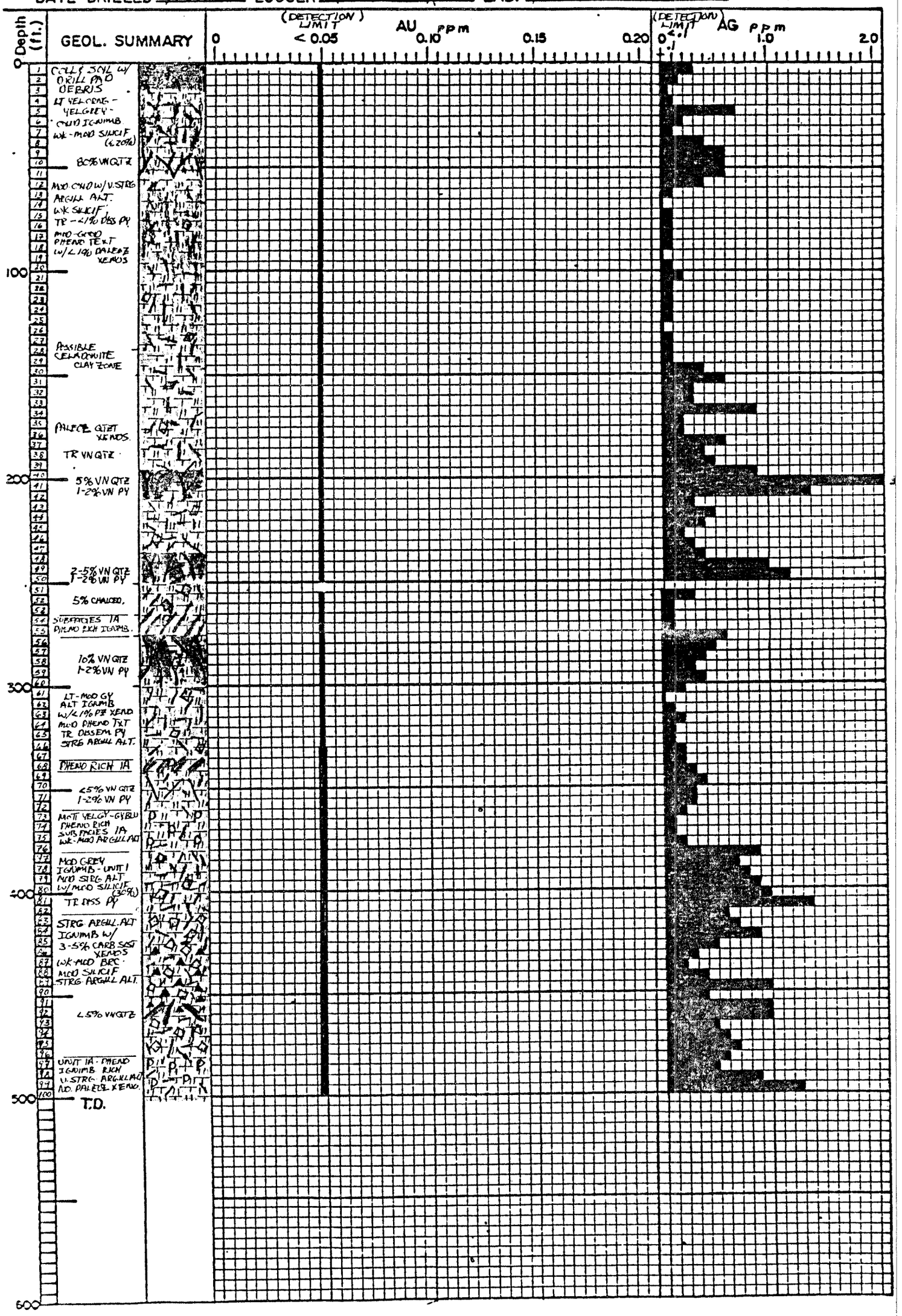
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-5

PROPERTY Cow Creek, (C.P.) STATE NEVADA COUNTY ELKO SECTION NW ¼ 6 T. 40N R. 50E

DATE DRILLED 8/16/83 LOGGER A.J. DEATRICK LAB. MONITOR LAB



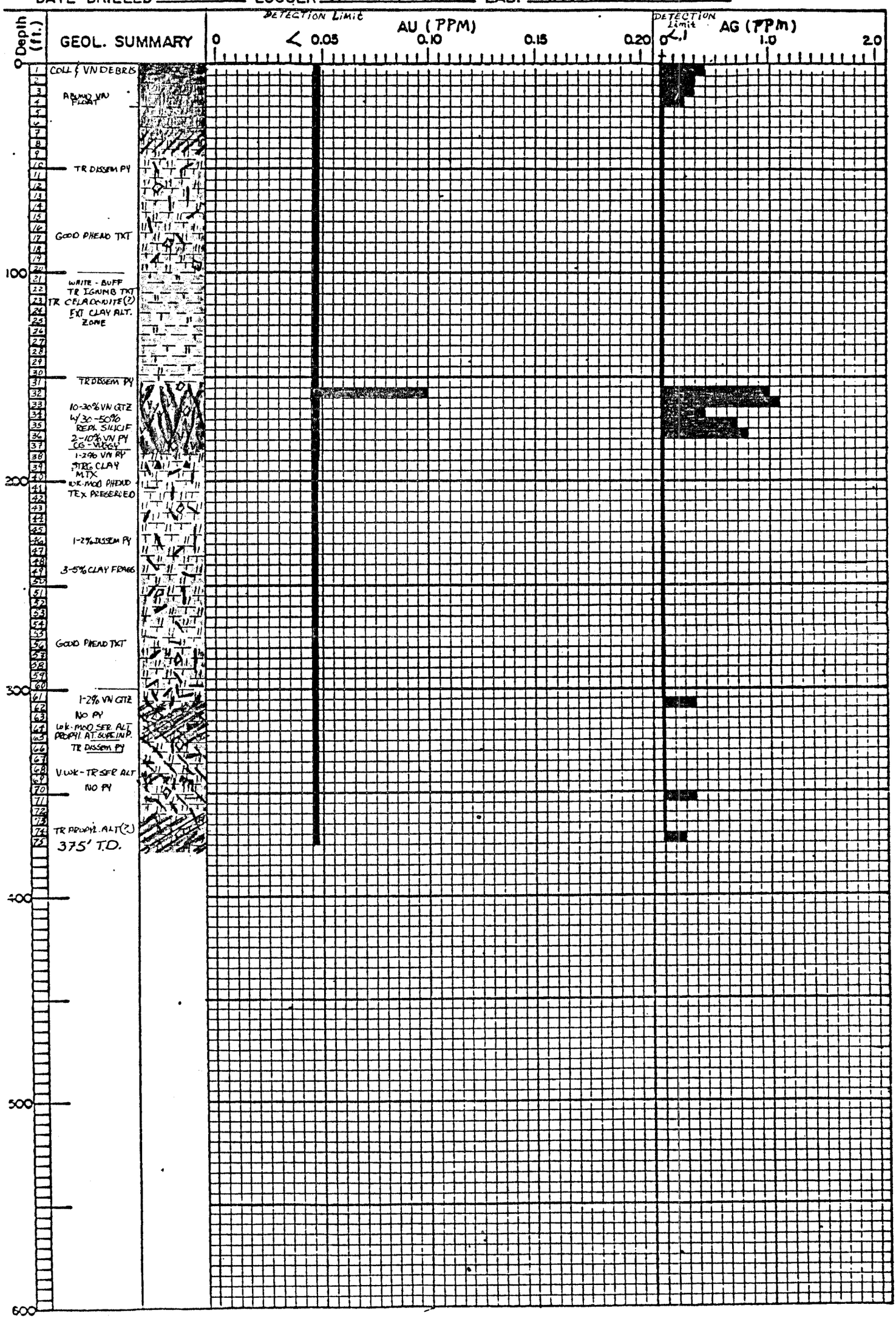
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC #6-A

PROPERTY COLD CREEK (C-P) STATE NEVADA COUNTY ELKO SECTION SW 1/4 SE 1/4 SEC 29 T. 41N R. 50E

DATE DRILLED 8-19-83 LOGGER A.J. DEADERICK LAB. MONITOR LABS.



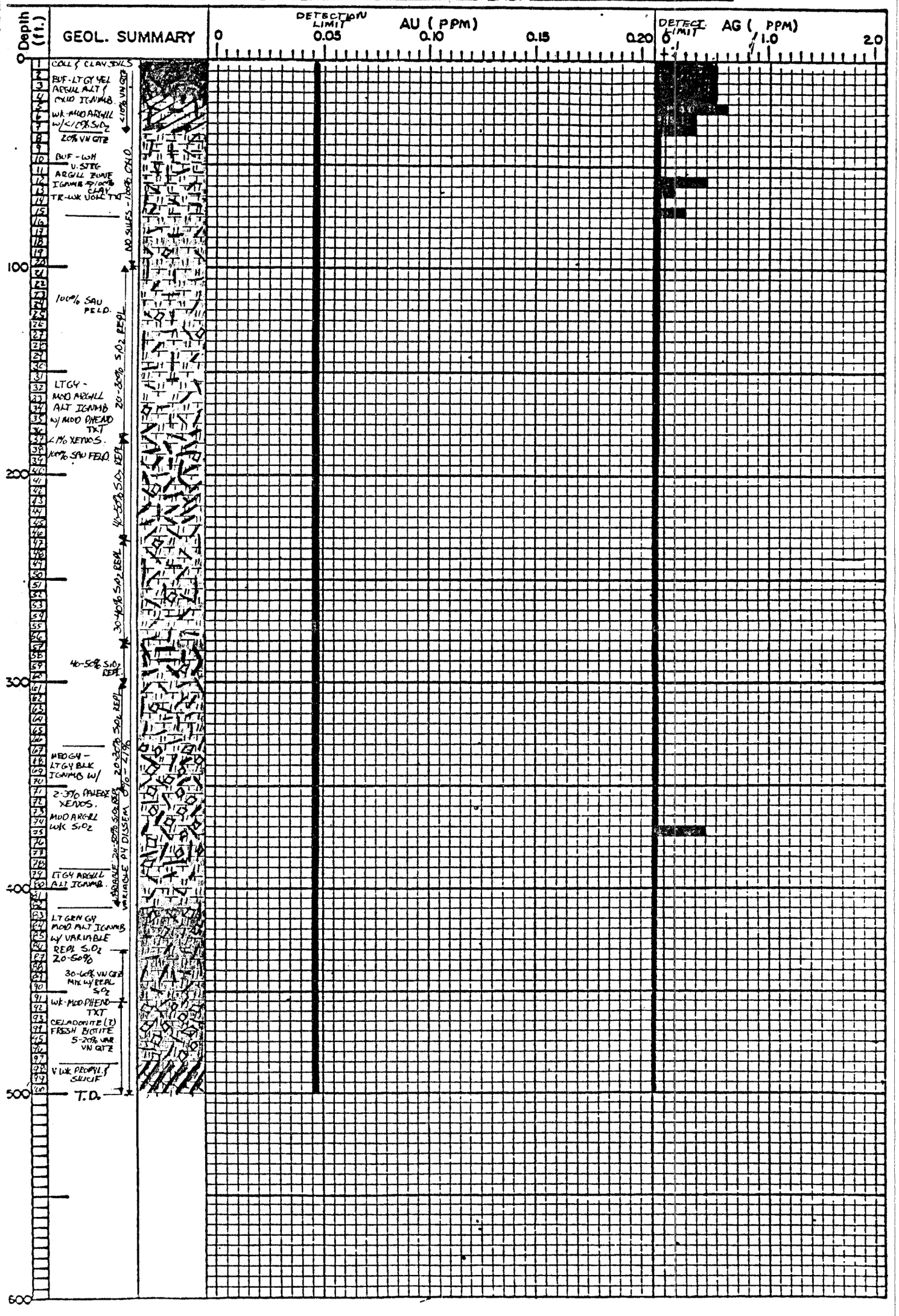
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-7

PROPERTY COW CREEK (C-P) STATE NEVADA COUNTY ELKO SECTION SW 1/4 29 T. 41N R. 50E

DATE DRILLED 8-21-83 LOGGER A.J. DEADERICK LAB. MONITOR LABS



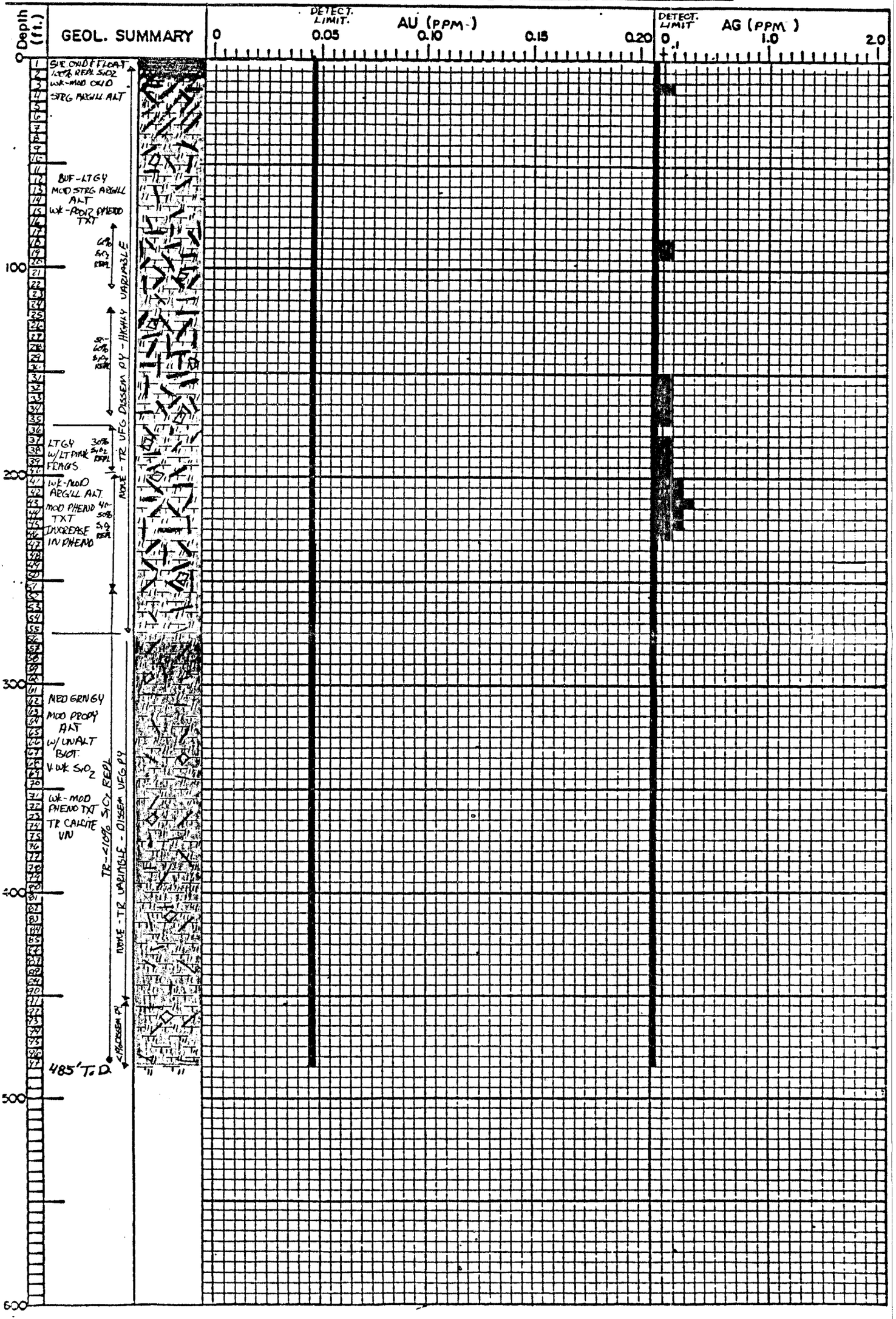
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-8

PROPERTY COW CREEK (CC-P) STATE NEVADA COUNTY ELKO SECTION 32 T. 41N R. 50E

DATE DRILLED 8-22-83 LOGGER A.J. DEADERICK LAB. MONITOR LABS



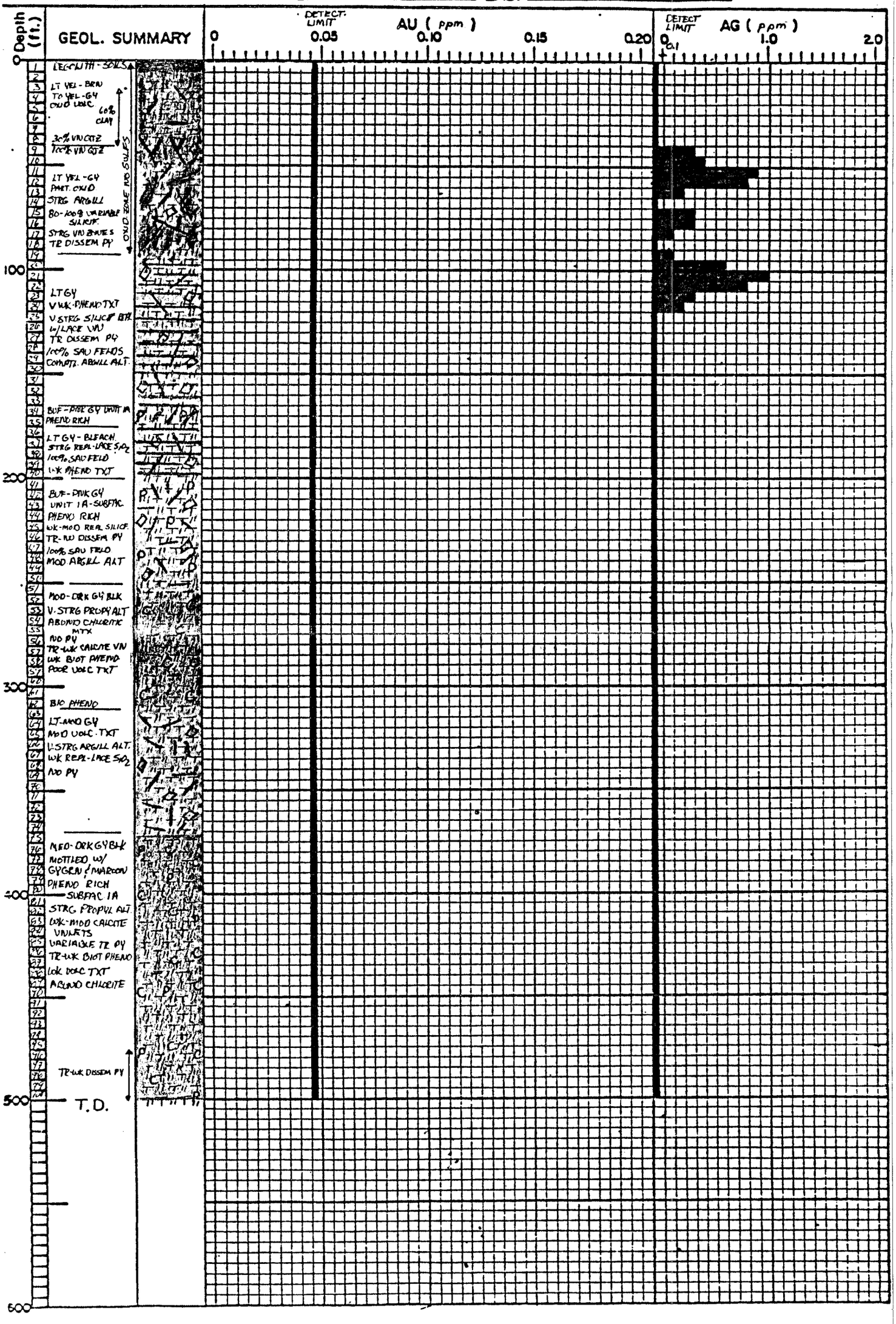
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-9

PROPERTY COW CREEK (C-P) STATE NEVADA COUNTY ELKO SECTION 32 T. 41N R. 50E

DATE DRILLED 8-23-83 LOGGER MJ EDICK / JV BIKUN LAB. MONITOR LABS



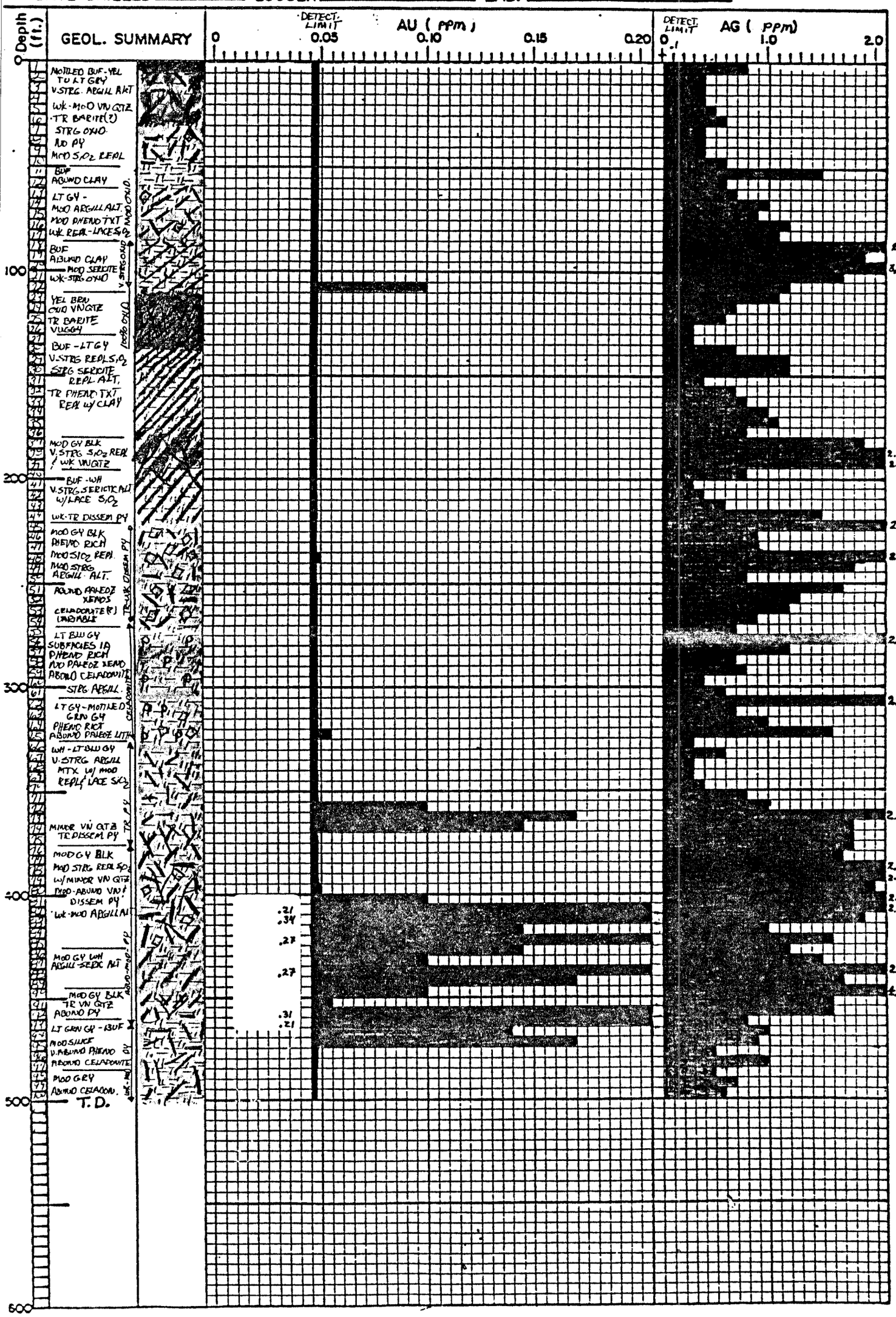
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-10

PROPERTY COW CREEK STATE NEVADA COUNTY ELKO SECTION 32 T. 41N R. 50E

DATE DRILLED 8-24-83 LOGGER A.J DEADERICK LAB. MONITOR LABS.



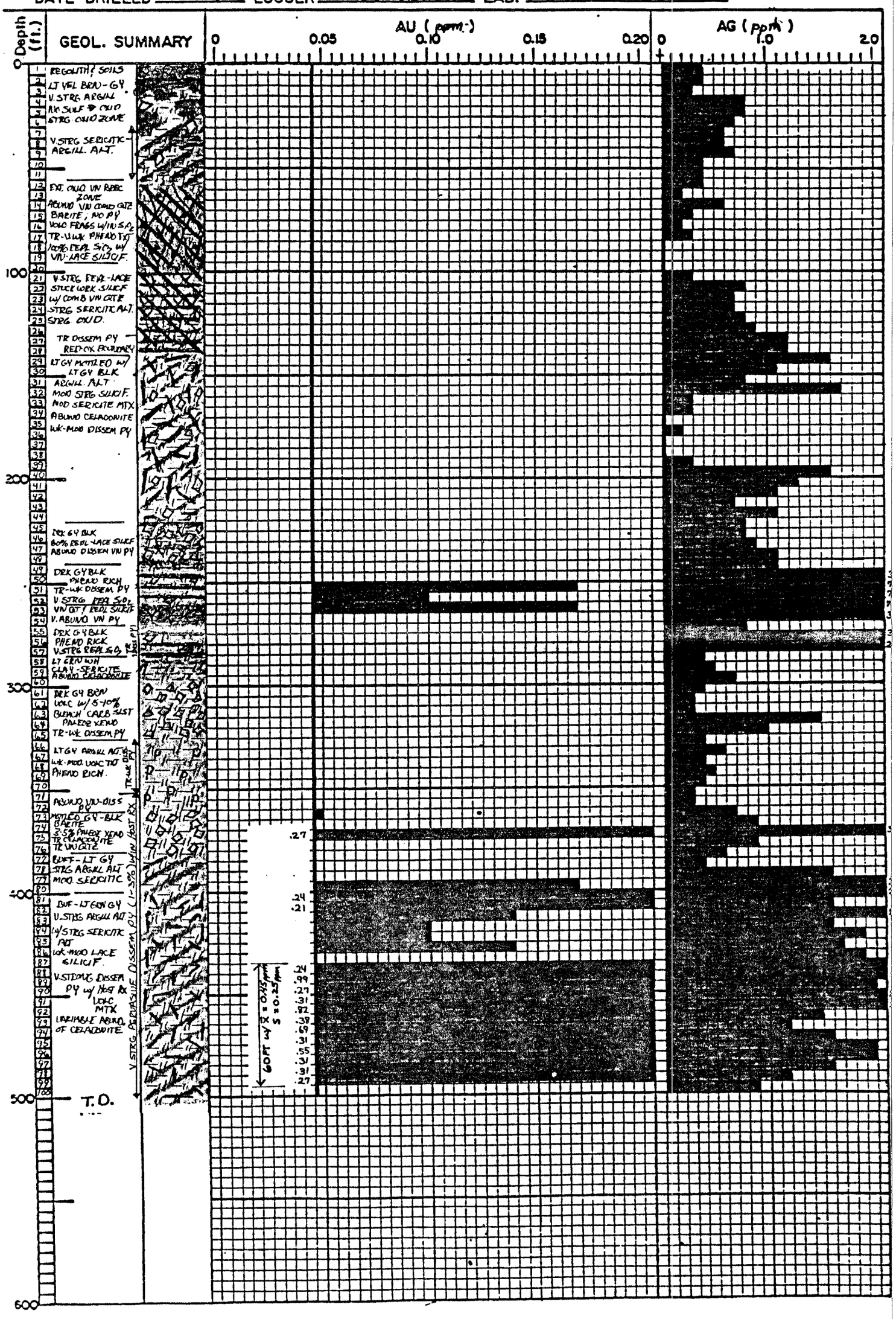
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-11

PROPERTY COW CREEK STATE NEVADA COUNTY ELKO SECTION 1 T. 40N R. 49E

DATE DRILLED 8-25-83 LOGGER A.J. DEADERICK LAB. MONITOR LABS.



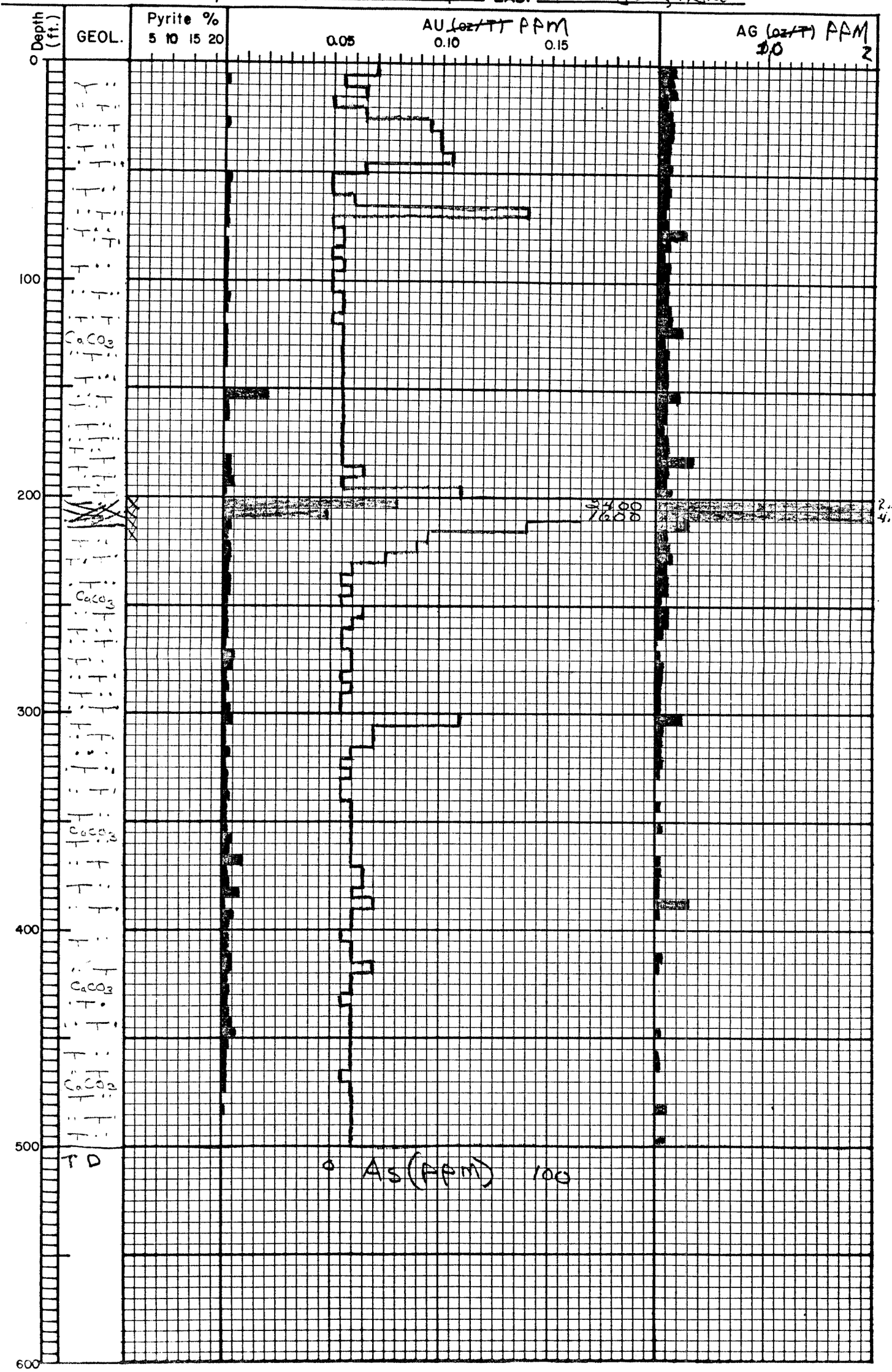
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-12

PROPERTY Cow Creek STATE Nev. COUNTY Elko SECTION 32 T. 41N R. 50E

DATE DRILLED 8/9-12/84 LOGGER ME & CER LAB. Barringer, Reno



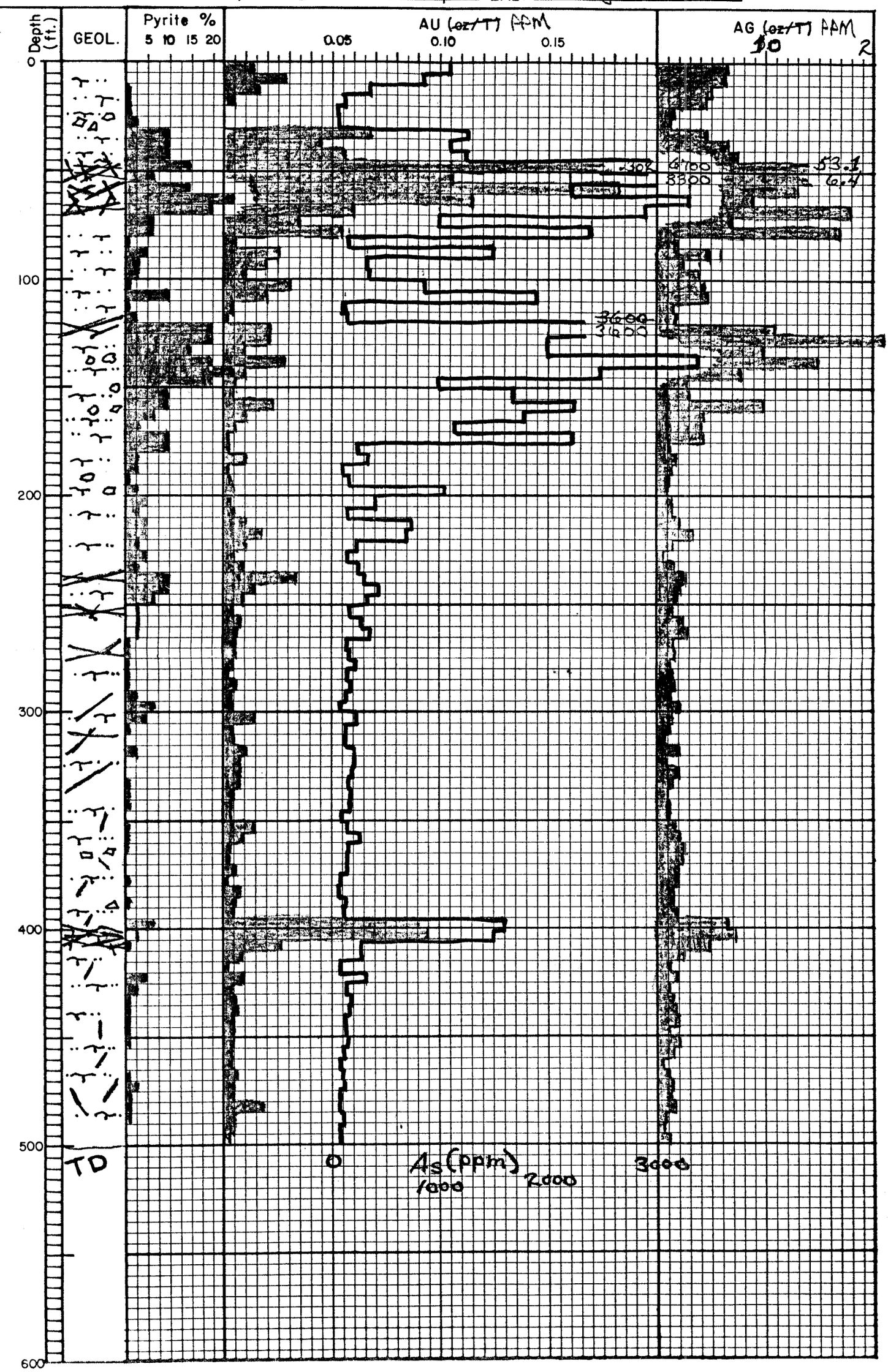
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC 13

PROPERTY Cow Creek STATE Nev COUNTY Elko SECTION 1 T. 40N R. 49E

DATE DRILLED 8/12-14/84 LOGGER ~~MES~~ CER LAB. Barringer, Reno



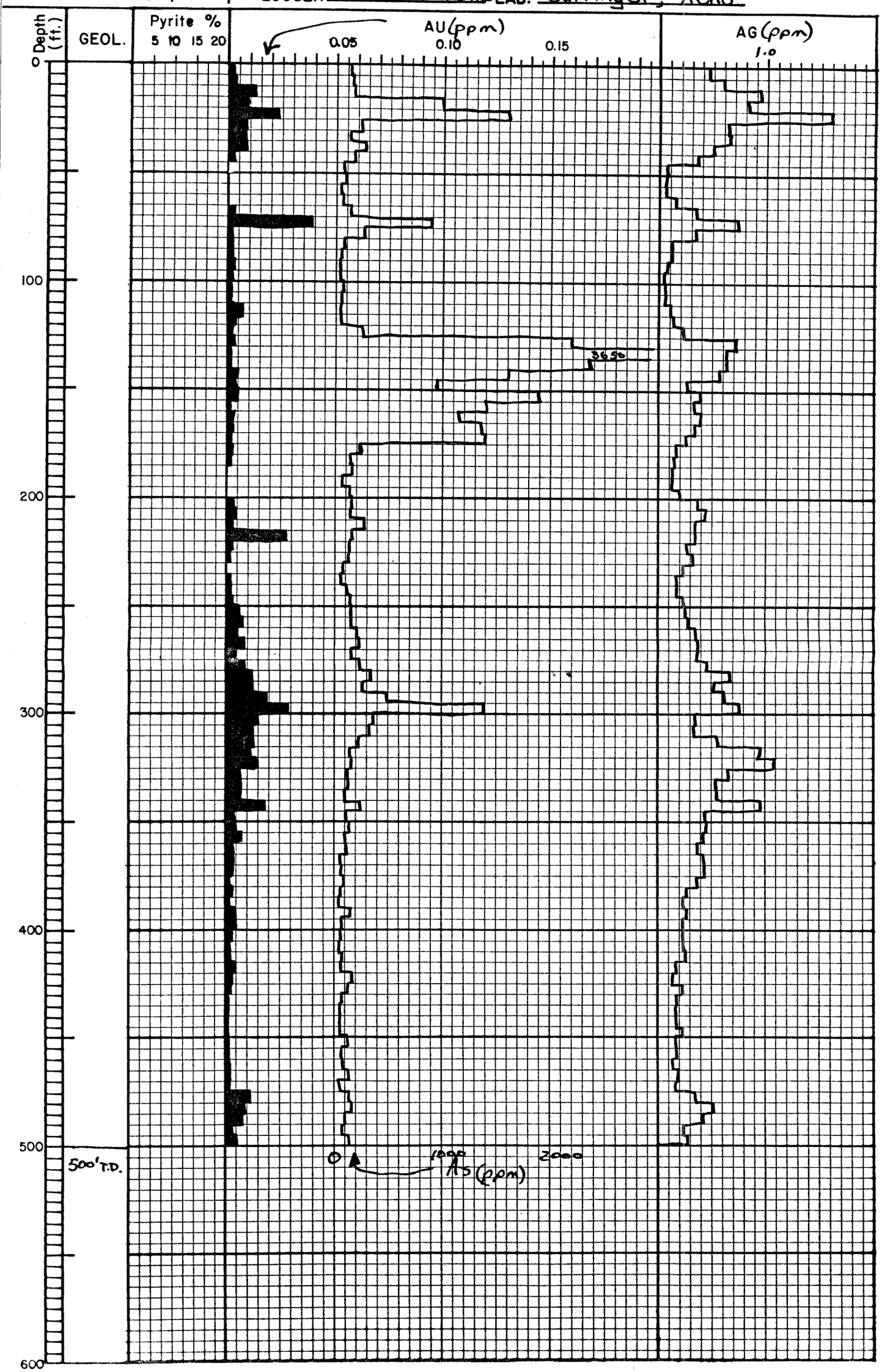
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-14

PROPERTY Cow Creek STATE NV COUNTY Elko SECTION 1 T. 10N R. 49E

DATE DRILLED 8/14-16/84 LOGGER Martha J. Edick Ellis LAB. Barringer, Reno



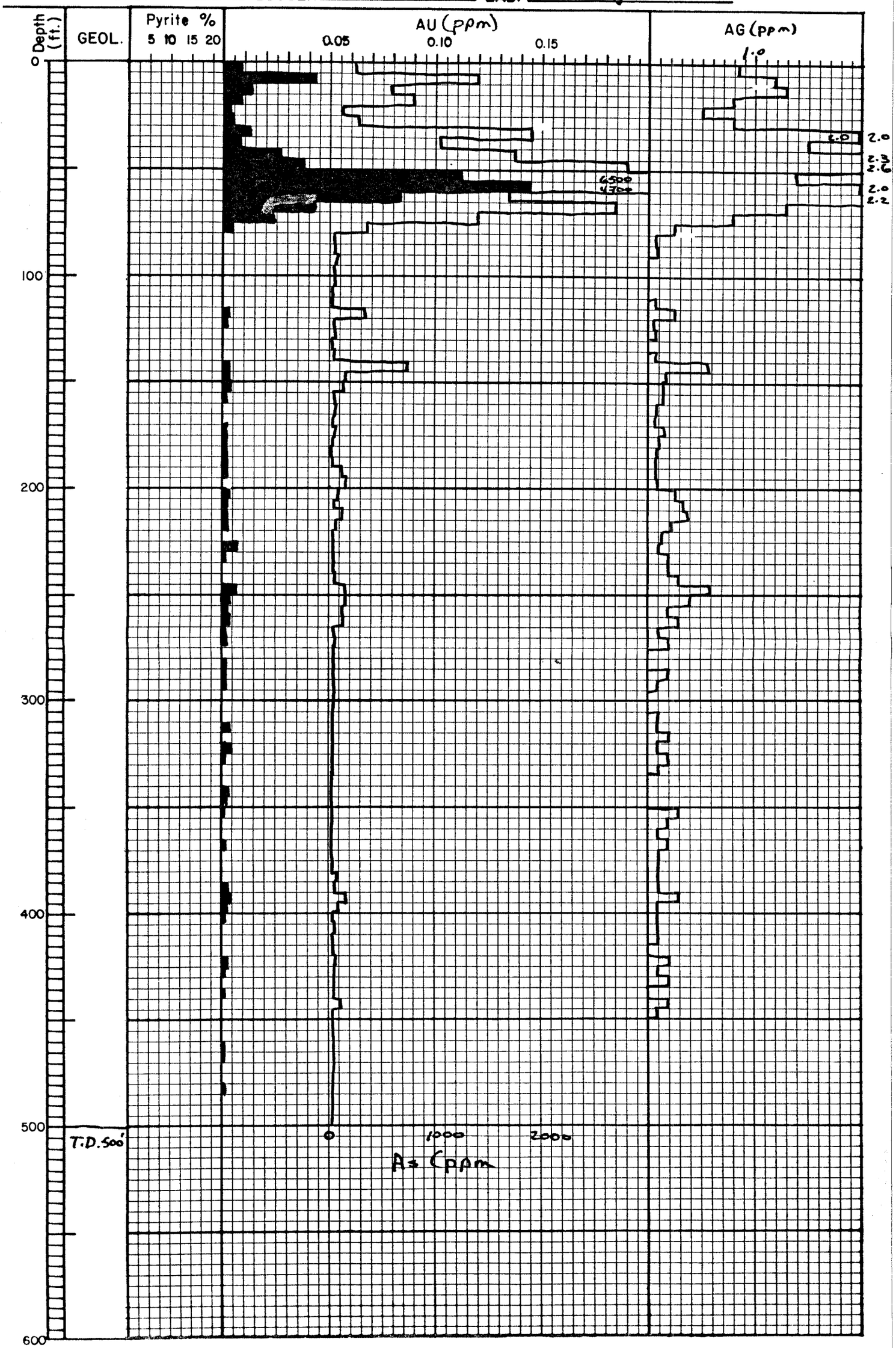
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-15

PROPERTY Cow Creek STATE Nv COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 8-24-84 LOGGER MVE² LAB. Barringer



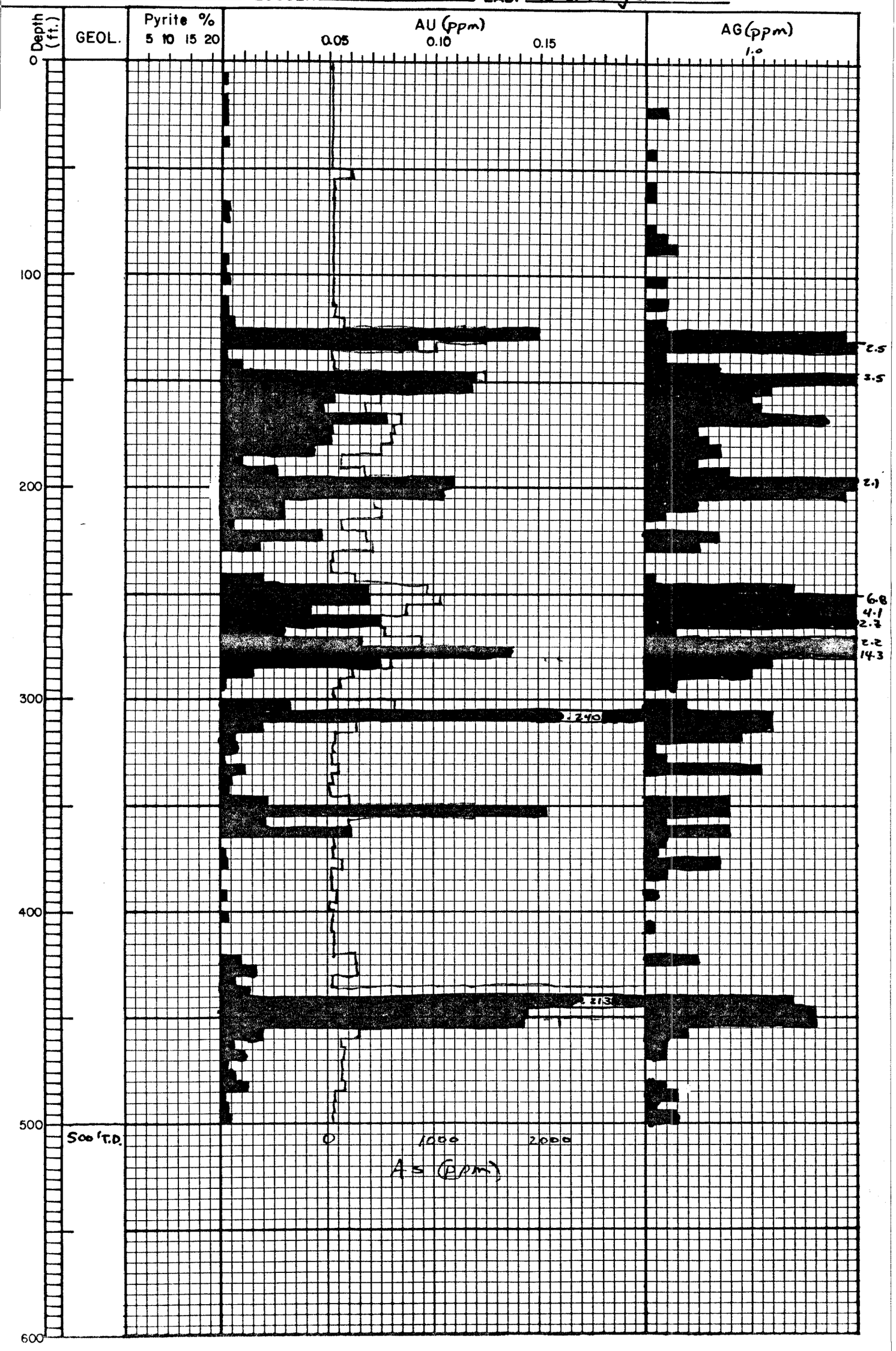
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-16

PROPERTY Cow Creek STATE Nv COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 8-27-84 LOGGER MJEE LAB. Barringer



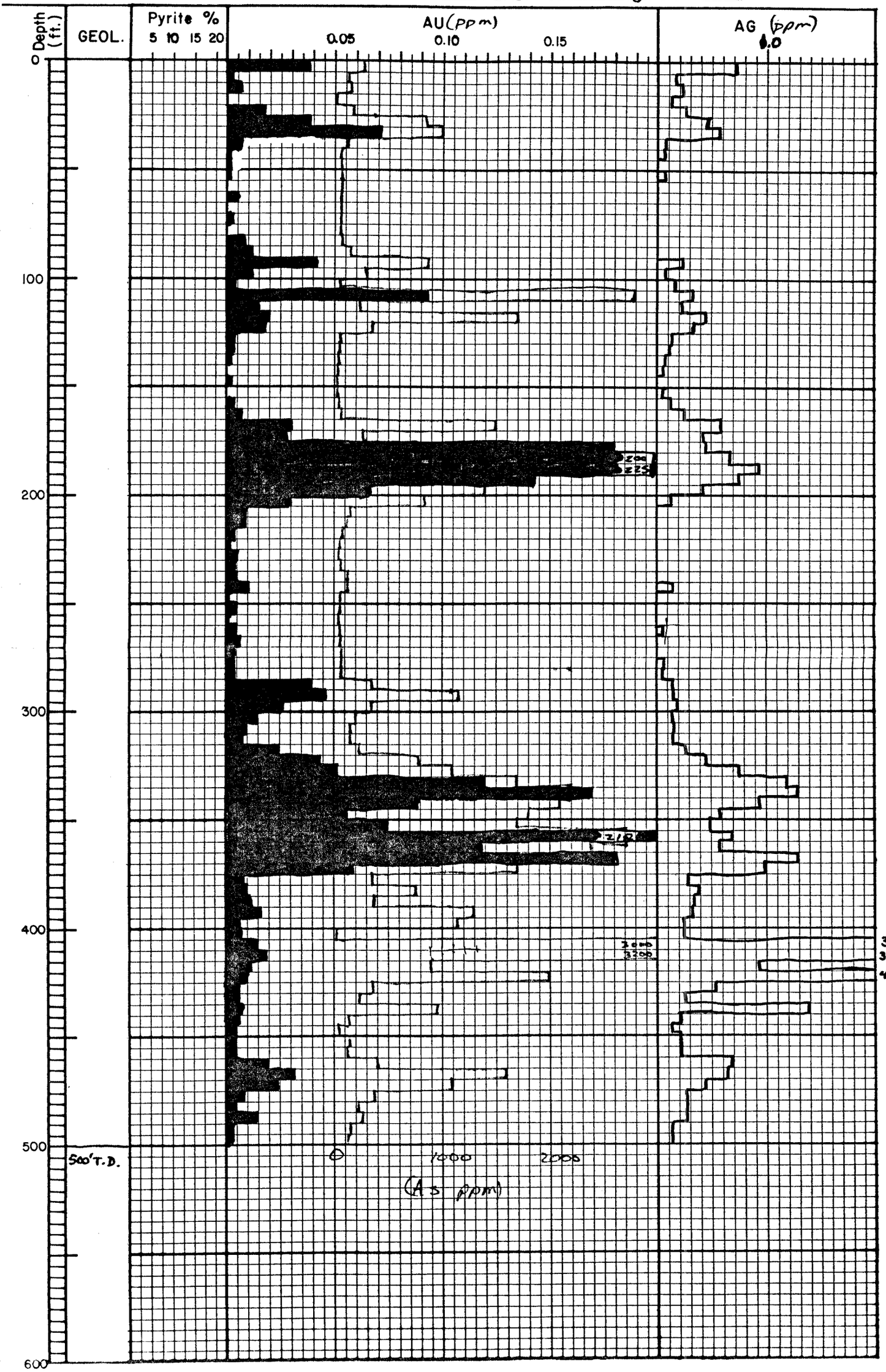
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-17

PROPERTY Cow Creek STATE Nv COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 8/30/84 LOGGER MEE LAB. Barringer



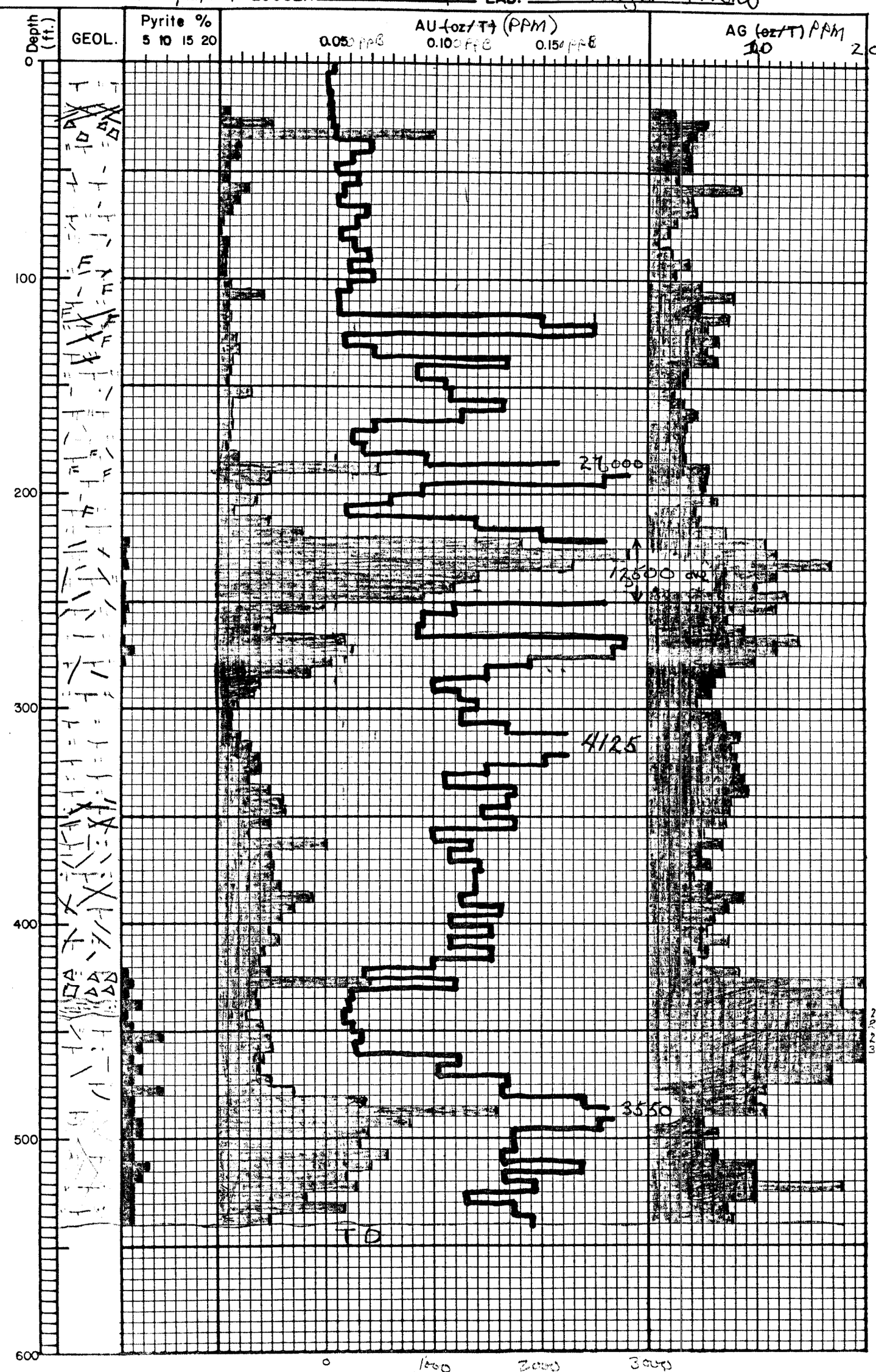
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. DH-CC-18

PROPERTY Cow Creek STATE Nev COUNTY Elko SECTION 32 T. 41N R. 50E

DATE DRILLED 9/5/84 LOGGER Martha Edick/Ellis LAB. Bonninger, Reno



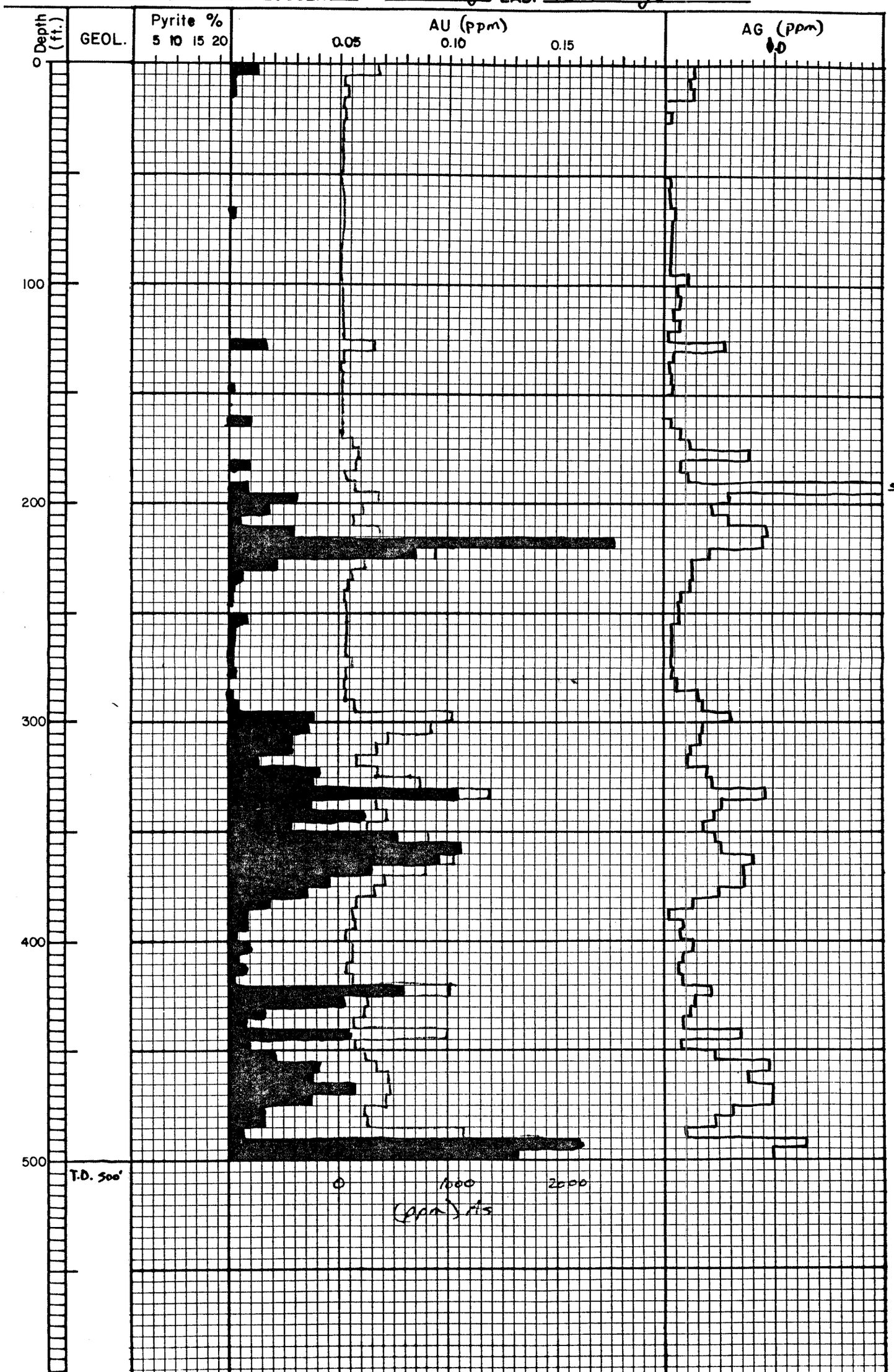
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-19

PROPERTY Cow Creek STATE Nv COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 9/9/84 LOGGER ____ S Borg LAB. Barringer



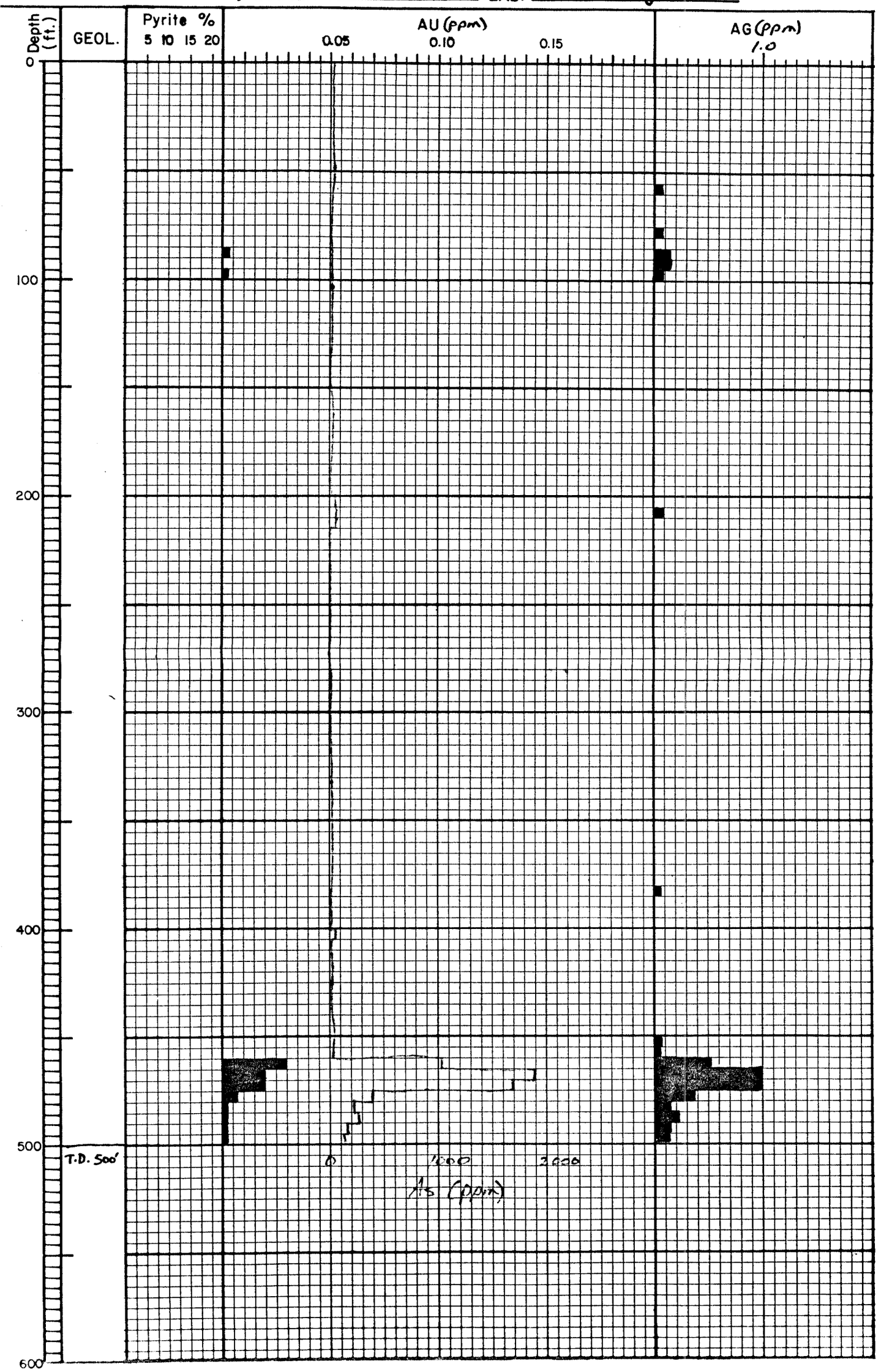
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-20

PROPERTY Cow Creek STATE NV COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 9/18/84 LOGGER S Bors LAB. Barringer



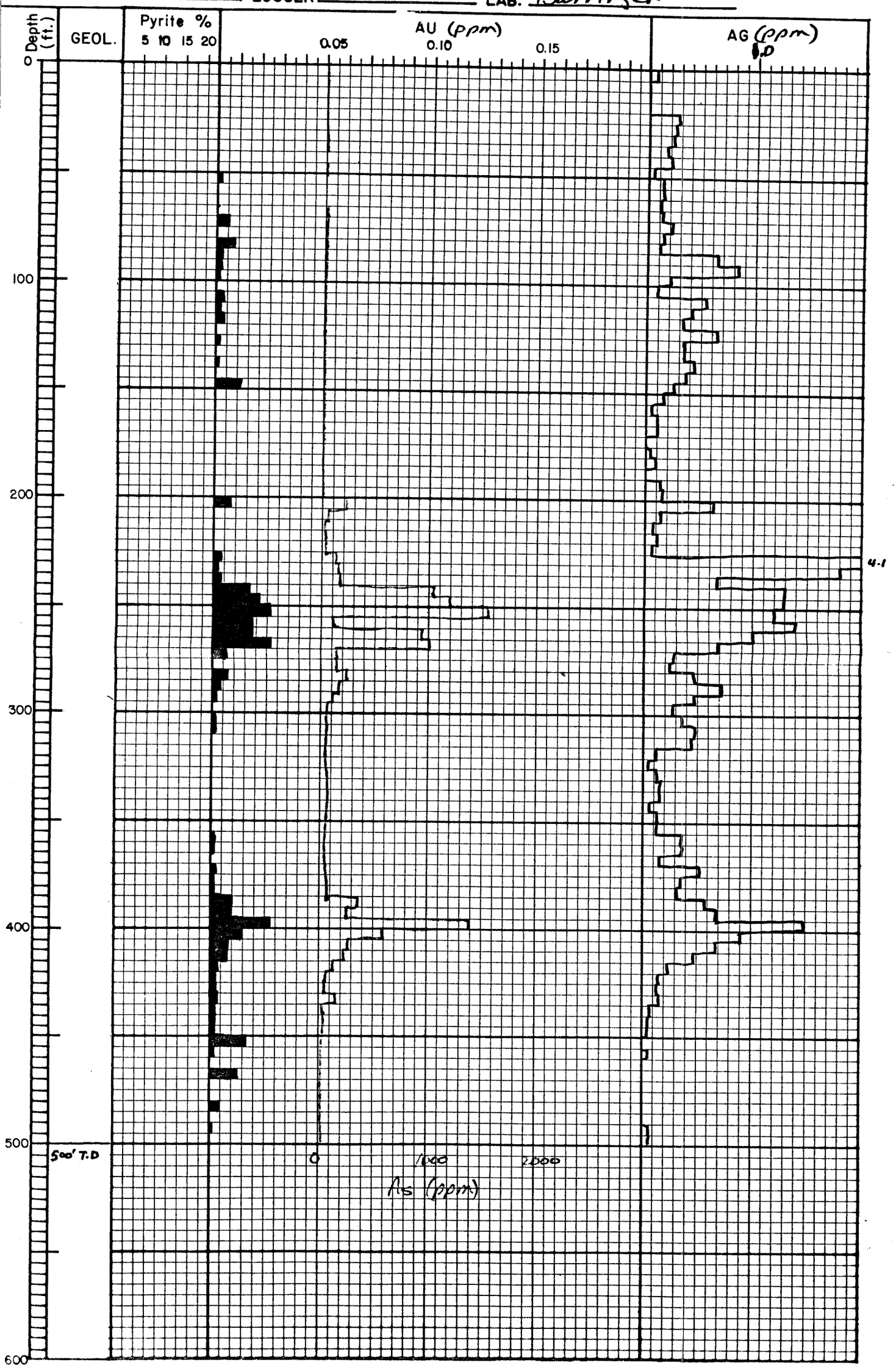
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-21

PROPERTY Cow Creek STATE NV COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 9/20/84 LOGGER MEE LAB. Barringer



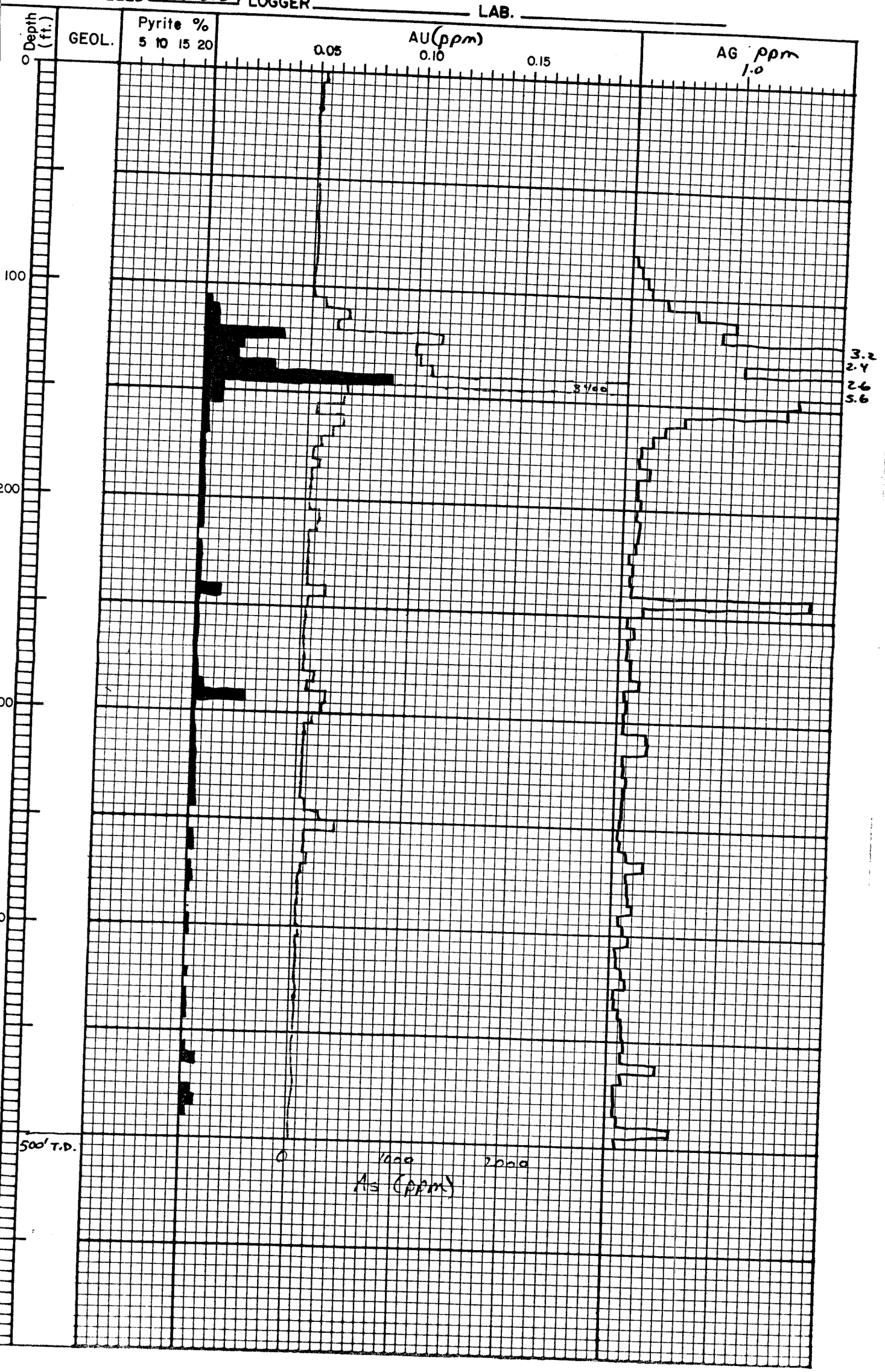
CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-22

PROPERTY Cow Creek STATE NV COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 9/23/84 LOGGER ____ LAB. ____



CRUSON AND PANSZE, GEOLOGISTS

DRILL HOLE SUMMARY

HOLE NO. CC-23

PROPERTY Cow Creek STATE NV COUNTY Elko SECTION ____ T. ____ R. ____

DATE DRILLED 9/26/84 LOGGER MEE LAB. Barringer