

PROPRIETARY

CALIFORNIA ENERGY COMPANY INC.

MAZAMA PROSPECT

KLAMATH COUNTY, OREGON

LITHOLOGY

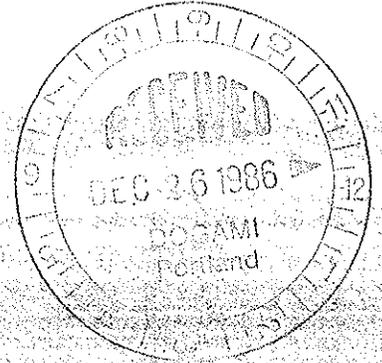
of CUTTINGS and CORE

to 1354 feet

November 1986

Columbia Geoscience

PROPRIETARY



CALIFORNIA ENERGY COMPANY INC.

MAZAMA PROSPECT

KLAMATH COUNTY, OREGON

LITHOLOGY of CUTTINGS

from 0 to 570 feet

November 1986

Columbia Geoscience

Hole MZI-11A

Cuttings Review

0-10 ft.

75% Beige, variably devitrified, pumice.

25% Subrounded to rounded mixed lithic igneous fragments.

Tr. sub-mm fragments of feldspar, hornblende and pyroxene are present.

10-20 ft.

a/a.

20-30 ft.

100% Light brown volcanic pebble conglomate. Matrix consists of devitrified pumice, sand size lithic fragments, and feldspar, hornblende, and pyroxene crystal fragments. The coarser fraction consists of angular to subrounded volcanic lithic fragments (rhyodacite?) and rounded devitrified pumice fragments. Note: Traces of dark red to orange red in matrix maybe cinnabar or hematite.

30-40 ft.

a/a

40-50 ft.

100% Mixed volcanic fragments, including angular to subrounded gray rhyodacite (?) and red to orange-brown tuff.

50-60 ft.

90% Gray to dark gray, scoriaceous to dense, hypocrySTALLINE basaltic andesite. The more dense fragments show loss of original texture due to metasomatic alteration. The pyroxene crystals are generally fresh with minor hematite alteration around the edges.

10% Mixed tuffaceous fragments.

60-70 ft.

a/a with minor light colored clay alteration and black hydrous Fe oxide precipitation along occasional fracture surfaces.

70-80 ft. Unwashed Sample

This sample consists of abundant red and gray clay and sand size crystal and lithic fragments. Coarser pebble sized fragments consist of lava and pumice clasts. It is difficult to determine how much of the coarser fraction is slough from up hole or how much of the clay and sand fraction is recycled drilling fluid.

80-90 ft. "Fine mud, driller couldn't catch sample."

Predominantly reddish clay and silt, sand size crystal and lithic fragments, and pebble size mixed volcanic fragments.

90-100 ft.

2% Dark gray scoriaceous basaltic andesite.

98% Red to gray, strongly hematite stained, locally vesicular andesite. Mafic minerals are strongly oxidized, with much of the original crystal morphology lost. The feldspar phenocrysts are variably altered to clay and possibly zeolite, and are often stained red from secondary hematite.

100-110 ft.

20% a/a.

80% Poorly lithified and strongly clay-altered scoriaceous to tuffaceous fragments with abundant secondary reddish hematite.

110-120 ft.

a/a

120-130 ft.

a/a

130-140 ft.

a/a. Note: Possible pipe dope in sample.

140-150 ft.

a/a

150-160 ft.

55% Brown to red devitrified basaltic tephra.

45% Red to gray strongly hematite and clay-altered basaltic lithic fragments.

160-170 ft.

60% red to gray strongly hematite- and clay-altered basaltic lithic fragments.

40% Brown to red devitrified basaltic tephra.

170-180 ft.

100% Red, locally gray, strongly hematite- and clay-altered basaltic lithic fragments.

180-190 ft.

100% Red-brown to gray strongly hematite- and clay-altered basaltic lithic fragments.

190-200 ft.

a/a

200-210 ft.

100% Red to dark gray, locally light green-gray, strongly clay altered basalt(?). Reddish color is due to secondary hematite staining. The green color is due to reduced Fe-bearing secondary clay (smectite?).

210-220 ft.

100% Light green-gray to dark green-gray clay altered dacite(?) with minor local red to orange hematite staining. Fresh sub-mm secondary pyrite crystals are common throughout the green-gray clay-altered rock.

220-230 ft.

100% Light green-gray, locally dark gray, strongly clay-altered dacite(?). Clear to milky precipitated cryptocrystalline silica is common throughout the fragments. Sub-mm black magnetite crystals are present, possibly as a surviving relic of the host rock. Sub-mm secondary pyrite is irregularly distributed through rock fractures, occasionally occurring as mm-size clusters. Minor clear tabular zeolite clusters are present in occasional vesicles and open fractures. Locally fine-crystalline veins of secondary calcite are observed.

230-240 ft.

a/a

240-250 ft.

Similar to above, though the degree of clay alteration in the rock is decreasing. Relict hematite alteration has been preserved in many fragments which have subsequently undergone silicification. Secondary alteration of mafic minerals to pyrite is common. No secondary calcite is observed.

250-260 ft.

a/a

260-270 ft.

a/a with rare traces of white acicular zeolite (natrolite series?). A marked reduction in secondary silicification is observed in this sample.

270-280 ft.

a/a with a continued decrease in the amount of silicification and secondary pyrite. No acicular zeolite observed.

280-290 ft.

40% Gray to very dark gray, locally red-gray dacite.
60% Very light gray, locally red-gray, strongly altered dacite. Mafic minerals are occasionally altered to magnetite, though more commonly to hematite. Alteration of plagioclase to clay ranges from moderate to extreme, occasionally with only casts of plagioclase crystals surviving. The groundmass is altered to white clay, clear tabular zeolite and rare traces of secondary sub-mm pyrite.

290-300 ft.

a/a with a vary few soft light green-gray fragments. The texture and degree of alteration is characteristic of a strongly sheared or faulted rock.

300-310 ft.

Similar to above with a general decrease in the degree of alteration. The mafic minerals continue to be strongly altered to hematite. Occasional fracture surfaces contain a light coating of green clay and sub-mm pyrite crystals.

310-320 ft.

a/a with a slight increase in the white clay-zeolite alteration. A few light green-gray fragments have a texture suggesting protomylonite.

320-330 ft.

5% Very dark gray fresh glassy dacite.

85% Gray to light green-gray, locally red-gray, strongly altered dacite.

10% Green-gray cataclastized dacite with many fragments having a mylonite to protomylonite texture.

Vein filling quartz and botryoidal cryptocrystalline silica are present in some of the dacite fragments. A few of the dacite fragments have been indurated with silica, often associated with secondary precipitated sub-mm pyrite crystals. Secondary zeolite alteration is associated with the more strongly altered and brecciated dacite fragments.

This sample consists of fresh glassy subvolcanic dacite, cataclastized rock associated with subvolcanic emplacement, contact metamorphosed rock and hydrothermally altered rock.

330-340 ft.

a/a

340-350 ft.

a/a with only rare traces of fresh glass.

350-360 ft.

30% Light green to green-gray brecciated and sheared dacite. The brecciated fragments contain cryptocrystalline silica and minor pyrite.

70% Gray to light gray altered dacite with variable amounts of secondary hematite.

Tr. dark gray fresh glassy dacite.

360-370 ft.

a/a

370-380 ft.

a/a with a decrease in brecciated fragments to 10%.

380-390 ft.

a/a

390-400 ft.

80% Gray to red-gray variably altered glassy dacite with secondary green-gray clay and pyrite along fracture surfaces.

390-400 ft. (cont.)

20% Light gray to green-gray, strongly sheared, brecciated and clay altered dacite with secondary sub-mm pyrite crystals.
Tr. orange oxidized mylonite fragments.

400-410 ft.

a/a with a marked increase in secondary clear tabular zeolite occurring along fracture surfaces.

410-420 ft.

a/a with 5% orange oxidized mylonite.

420-430 ft.

a/a

430-440 ft.

a/a with 20% orange oxidized mylonite. Note, all Fe appears to occur as hydrous Fe oxides in orange fragments.

440-450 ft.

90% Gray fresh to slightly altered dacite. Very localized reddish zones in the groundmass are the result of hematite alteration. Rare traces of secondary pyrite occur along fracture surfaces has formed subsequent to the hematite alteration.

5% Light green to light green-gray mylonite with secondary sub-mm pyrite and minor clear tabular zeolites.

5% Orange hydrous Fe oxide bearing mylonite. Hydrous oxidation of Fe appears to be the most recent alteration event.

450-460 ft.

a/a

460-470 ft.

a/a with an increase in the amount of clear tabular zeolite along fracture surfaces; continued tr. of orange mylonite.

470-480 ft.

10% Orange mylonite, the result of Fe oxidation in the light green-gray mylonite.

10% Light green-gray mylonite a/a.

80% Gray to dark gray variably altered dacite a/a.

480-490 ft.

a/a with only a trace of the orange oxidized mylonite.

490-500 ft.

a/a with occasional calcite crystals occurring with clear tabular zeolite crystals in fractures.