LITHOLOGIC LOG

Project: Alum

Hole: 1186-40 (24-33)

Elevation: 5100 feet

Date Drilled: 25/6/82

Location: SENW Sec 33 T1N R38 1/2E

Method: rotary/air and/or mud

Geologist: Bill Huntsman/D. Pilkington

Gamma:

Depth (m)	Description
	Lower Esmeralda Fm (upper part Unit F)
0 - 137	Interbedded yellow to orange siltstones, sandstones and claystones with abundant gray vitric tuffs. Kaolinitic and/or montmorillonite alteration of vitric materials common. Disseminated pyrite common in the argillic tuffs. Water entry at 110 meters.
137-161	Layer of light gray lithic-vitric-crystal tuff. Rocks are weakly altered to clays and contain 1-2 percent disseminated pyrite.
161-198	Interbedded claystone, siltstone, sandstone and vitric tuff. Rocks all display weak alteration to clays as a result of devitrification of the contained volcanic glasses.
198-223	Layer of light gray lithic-vitric-crystal tuff with abundant clay alteration and minor disseminated pyrite.
223-271	Interbedded claystone, tuffaceous siltstones and/or fall tuffs. Abundant gray green to brown clay formed by devitirification of volcanic glass.
271-280	Light gray lithic-vitric-crystal tuff - partially altered to clays. Minor disseminated pyrite.
280-344	Interbedded claystone, siltstone and tuffaceous shale with considerable carbonaceous material. Devitrification of volcanic glass common and results in gray-green to brown montmorillonitic clays. Disseminated pyrite in the 1-3 percent range.

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Hole: 1186-40 (24-33)

Elevation: _____ Date Drilled: _____

Location: _____ Method: _____

Geologist: _____ Gamma: _____

Depth (m)	Description
344-354	Light gray crystal-lithic-vitric tuff, fractured hot water entry at 345 & 350m with some cacite fracture fillings. Some signs of oxidation of the disseminated pyrite.
	Lower Esmeralda Fm (lower part Unit F)
354-415	Light gray to medium gray siltstones, some interbedded tuffs which are altered to clays. Abundant dissiminated pyrite 3-5 percent - probably related to the geothermal fluids. Some evidence of oxidation along the fractures, especially at 360, 411 and 415 m.

LITHOLOGIC LOG

Project: Alum

Hole: 24-33 (1180-40)

Elevation: 5100

Date Drilled: 6/25/82

Location: SENW Sec 33 T1N R38 1/2E

Method: rotary air and/or mud

Geologist: Huntsman

Gamma:

Depth (m)	Description
0- 37	Alluvium - Consisting of argillic tuff and claystones, light yellow, slightly hard, minor pyrolusite, hematite and other primary oxidation minerals. Hematite and pyrolusite increasing with depth.
37- 52	Alluvium - Claystone and sandstone rock fragments. Claystone has hematite and pyrolusite staining. Sandstone is very fine, silty, very good sorting with abundant kaolinite; hematite and minor pyrolusite and biotite.
52- 64	Alluvium - Sand siltstone, light orange, with abundant clays, hematite staining, minor pyrolusite and biotite. Also some argillic tuffs.
64- 67	Argillic Tuffs - 100% altered to light yellow clays with minor limonite, trace hematite, silty sandstone as above. Some minor blue-gray clays. Base of surface oxidation.
67- 70	Rhyolite Fragments - Light purple gray, weathered, minor clays from above.
70- 79	Argillic Tuffs - Rusty to medium brown. Soft good drilling, trace pyrite.
79- 82	Clays - Light green gray and tan. Argillic tuffs, the green appears to be weakly reduced.
82-128	Argillic Tuffs - Medium gray, minor shinny pyrite soft, good drilling.
128-131	Clay - Light to medium gray silty clays, harder than above unit, argillic tuffs.
131-137	Clay - Medium brown, soft, slightly sticky.
137-140	Ash Fall Tuffs - Light gray, slightly hard, weakly altered to clays, dissiminated pyrite, shinny, minor gray clays.

LITHOLOGIC LOG

Project: Alum

Hole: 24-33

Elevation: _____ Date Drilled: _____

Location: _____ Method: _____

Geologist: _____ Gamma: _____

Depth (m)	Description
140-143	As above, more altered to clays, softer.
143-161	As above, abundant kaolinite, moderate shinny pyrite. Minor blue-gray clays.
161-171	Clays - Light blue-gray, trace pyrite, silty, soft.
171-186	Clays - As above with increasing silt and hardness.
186-192	Siltstone - Light blue-gray, trace pyrite, slightly hard.
192-195	Clays - Gray, soft, sticky.
195-198	Clay - Light gray, silty, trace pyrite, argillic tuff, minor kaolinite, some very soft clays, some slightly hard and waxy.
198-216	Ash Fall Tuffs - Light gray, trace pyrite, minor black minerals, slightly hard, mostly alterated to clays.
216-223	Ash Fall Tuffs - As above with hard fragments of rhyolite.
223-226	Clay - Light brown, soft, slightly sticky, minor fragments from above.
226-253	Tuffs - Medium gray, abundant shinny pyrite, hard stringers of black fragments, minor alteration to clay.
253-256	Clay - Light gray silty clay, same unit as above but highly altered to clays.
256-271	Clay - As above with some brown green and gray clays. Green is very hard and waxy.
271-280	Ash Fall Tuffs - Abundnt black fragments, hard gray-green stringers of a ash fall, trace pyrite.
280-283	Clay - Stringer of brown waxy clay.

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Geologist: _____ Gamma: _____

Depth (m)	Description
283-338	Siltstone - Light blue-gray-green as above (same unit) harder, minor pyrite, minor alteration.
338-341	Siltstone - As above, abundant shinny pyrite, very hard, slow drilling, minor chalcedony, minor clays.
341-344	Clays and Siltstone - Light gray brown, moderate shinny pyrite, slightly hard.
344-350	Ash Fall Tuff - Light brown gray, hard, moderate pyrite.
350-354	Ash Fall Tuff - As above with trace hematite, weak to moderate 2ox in a few zones (possible fractures for hot waters) trace calcite.
354-375	Siltstone - Light gray, hard, abundant shinny pyrite.
375-384	Siltstone - Light to medium gray, abundant sulfides including marcacite, and shinny pyrite. Very hard lenses of green shale, minor brown clays.
384-405	Siltstone - As above.
405-411	Siltstone - Light gray, moderate brown clays, abundant shinny pyrite, moderate amounts of calcite.
411-415	Siltstone - As above with weak hematite staining, possible fractures. Siltstone and clay interbedded.