847-1

Project Jemez
Hole 847-1
Location SE¼ SE¼ NW¼ 32 21N 5E
Elevation 9600'
Method Foam
Dates 8-24 → 8-26-79
γ ~120

depth (ft.)

0-40. Mixed volcanic lithologies, dark grey-brownish porphyritic latite (Rhyolite?) with Qtz, sandidine, plag, some augite, Also some pyrite xtalization. Also appearance of whitish tuff with ≈30% Qtz crystals

40-110 Same as Above, Also the introduction of a lighter grey lith with A few phenos of Augite, And feldspars
110-130 same basic lith however whitish tuff seems to be more predominately pumice
130-150 predominately tuff~pumice, whitish float.
150-230 back to three distinct lithologies (same as Above)
230-260 Same 3 lith but Also some obsidian frags (~ 2-3%)
260-280 obsidian disappeared Same liths As Above
280-310 primarly ligh grey porphyritic latite (Rhyolite?) Phenos of sandidine, qtz., plag., And horn blende
310-330 primary pumice (with some other liths from Above) Also some obsidian (~ 1-2%)
340-370 back into mixed liths
370-380 fine grain pumice frags
380-400 mixed liths As Above; with obsidian (2-5%)
400-420 slight color change brownish-red Also lith frags Appear to be more Rounded. Seems to indicate a paleo surface and possibly an Alluvial environment. Composition is basically the same latitic, Rhyolitic, the tuff~pumice is Almost Absent., some obsidian well rounded
420-450 back to 2 liths As Above (No pumice)
450-500 all 3 liths once again present

(over)

Project	Jemez
Hole	847-2
Location	SE¼ NE¼ NE¼ 31 21N 5E
Elevation	9740'
Method	Foam. Hammer 120-161m
Dates	8-26 → 8-28-79
γ	~120 cps

Depth	Description
0-20m	Mixed volcanic material & gray latite lava, white pumice lapilli, and rhyolitic (?) f.g. lava. Interpreted as colluvial material shed into valley bottom from adjacent Cerro Toledo Rhyolite and Tschicoma formations
20-120m	Mixed rhyolitic (?) material including fine grain to aphanitic light gray lava fragments and pumice lapilli. Variations in lava to pumice ratios. Many lost circulation zones. Interpreted as bedded lapilli tuffs with high content of volcanic xenoliths.
120-152m TD	Fine grain rhyolitic lava flow. Continued lost circulation zones, interpreted as fractured or jointed (cooling) lava.

Comments: No significant water encountered in hole. Formations probably dry to subsaturated. Graded bedding of lapilli tuffs produces porosity - permeability contrasts between layers of air fall deposits. Layers several centimeters to a meter thick gather and possibly conduct horizontally the groundwater that is percolating downward.

Project	Jemez
Hole	847-3
Location	NW¼ NE¼ NW¼ 31 21N 5E
Elevation	9880'
Method	Foam
Dates	8-31 → 8-31-79
γ	~ 120 cps

Depth	Description
0-25 m	Very loose, porous lapilli tuff: 80% white pumice fragments some with biotite and hornblende phenocrysts; 15% clear anhedral to subhedral quartz and sanidine; 5% xenoliths ?-of gray latite. Minor black obsidian.
25-30 m	Mixed latitic and rhyolitic lava fragments. < 5% pumice ~5% quartz and sanidine as above.
30-92 m TD	Varying amounts of white pumice, latitic and rhyolitic lava fragments and 1-5% quartz plus sanidine. Pumice approximately 10 - 15 % by volume.

Comments: No significant water encountered. Assumed subsaturated. Formations are probably Bandelier tuff or equivalent. The zone from 25-30 m is interpretted to be a colluvial zone between pyroclastic events. Lowest formation is probably poorly welded crystal-lithic tuff.

Project	Jemez
Hole	847-4
Location	NE¼ SE¼ NE¼ 36 21N 4E
Elevation	9600
Method	Foam. Hammer: 122 m → 161 m TD
Dates	8-29 → 8-31-79
γ	~ 120 cps

Depth	Description
0 - 100 m	80-90% rhyolite. Material is both as aphanitic lava fragments and pumice. 10-20% gray to brick red quartz latite. Accessory quartz and sanidine.
100-152m	Gray to brick red quartz latite. Contains white feldspar phenocrysts and fine grain to aphanitic ground mass. Accessory hornblende and biotite.

Comments: No significant water encountered. Assumed subsaturated. Top unit is probably a lapilli tuff of the Bandelier formation. Lower unit is interpretted to be a lava flow of the Tschicoma formation. Occassional pumice fragments in samples below 105 m are interpretted to be washout material from upper unit.

Project	Jemez	JT Gross
Hole	847-5	
Location	SW¼ NE¼ SE¼ 28 21N 5E	
Elevation	10,930	
Method	hammer / foam	
Dates	8-19 → 8-20-79	
γ	~150 cps	

Depth	Description
0 - 70m	Hornblende, plagioclase quartz latite porphyry. Matrix predominantly gray and fresh in appearance but some cuttings oxidized to brick red color. Groundmass fine grain to cryptocrystalline. Plagioclase phenocrysts somewhat smaller and sparser than most of Tschicoma formation. Hornblendes 1-3 mm.
~70m	Fine grain basaltic chips encountered in one 10' sample pile. Possible basalt dike.
70-100 m	Same material as 0-75 m
100-134 m TD	Quartz latite porphyry similar to 75-105 m, but cuttings coming back larger and groundmass grayish-purple. Plagioclase phenocrysts more abundant, larger (3-4 mm) and more albitic. More abundant quartz phenocrysts. Probable flow contact at 105 m. Possible alluvial debris at 110m and 116 m noted. Small traces of fine-grain turquoise color mineral noted at 112-120 m

Comments : Penetration rates : 60'/hr. to 380' (122m)
20'/hr. to 440' TD.

Driller reports saturated rocks below 65 m.
Tschicoma Formation

Project	Jemez
Hole	847-7
Location	NW¼ NE¼ NW¼ 30 21N 5E
Elevation	9,980′
Method	hammer/foam
Dates	8-10 → 8-10-79
γ	~ 150 cps

JT Gross

Depth	Description
0-27m	Sandy, brown clay and lithic fragments of varying size of pyroxene andesite and quartz latite. Apparently slide material and colluvial infill to South Fork Polvadera Creek.
27-92m TD	Brick red and dark gray hornblende, plagioclase quartz latite porphyry. Groundmass fine grain to glassy. 87-97m more highly oxidized to brick red color.

Comments: Driller reports rock hard enough to hammer, but fast penetration ~ 80′/hr. Also much water made during drilling. Rocks are presumed to be saturated, lateral groundwater motion expected in steep upper drainage basin.

0-97m TD, Tschicoma formation

Project	Jemez	JT Gross
Hole	847-8 NW¼ NE¼ NW¼ 25 21N 4E	
Elevation	9970'	
Method	hammer/foam	
Dates	8-6 → 8-8-79	
γ	~150 cps	

Depth	Description
0-3 m	Red clay and silt, 90%. Lithic fragments of porphyritic quartz latite
3-38 m	Brick red and dark gray hornblende, plagioclase quartz latite porphyry. Hypocrystalline to Holocrystalline, groundmass generally cryptocrystalline. Some hornblendes show red oxidation (resorption) rims. Plagioclase phenocrysts 1-2 mm. 6-9 m, slightly more weathered and containing more clay. 23-26 m, containing more megascopic quartz.
38-52 m	Medium gray pyroxene, hornblende andesite porphyry. Some cuttings show a trachytic texture. Groundmass appears glassy.
52-92 m TD	Porphyritic quartz latite as above but with increased quartz phenocrysts. 77-97 m possibly more alkali-rich lava. Phenocrysts of plagioclase are larger (to 5 mm) and more albitic in appearance.

Comments: Driller reports penetration rates 80'/hr. to 40 m
20'/hr. to 97 m TD
Water not encountered in any significant quantities.

Apparently Tschicoma formation as mapped by Smith, Bailey, and Ross, 1970 and as described by Griggs, Roy L. 1954 Geology and Ground-Water Resources of the Los Alamos Area, New Mexico

Project	Jemez
Hole	847-9
Location	SW¼ SE¼ SW¼ 23 21N 4E
Elevation	9790'
Method	Hammer / foam
Dates	8-22 → 8-22-79
γ	~120 cps

Depth	Description
0-70 m	Orange-tan to brick red biotite quartz latite porphyry. Some cuttings are fresher in appearance and gray in color. Feldspar phenocrysts vary in size and abundance. Some cuttings devoid of any phenocrysts. Feldspar, quartz, and biotite in 90% of samples. Aphanitic groundmass ~ 80% by volume. Quartz phenocrysts are often quite clear and perfectly euhedral bipyramids. Tehicama Formation
70-122 m TD	Mixed rhyolitic material. Some cuttings showing flowbanded texture and were apparently lava. Some material more white and pumiceous and resembling many off the local lapilli tuffs i.e El Cajete Member of the Valles Rhyolite, S,B,R, 1970. All cuttings contain biotite phenocrysts, and are fine grain to aphanitic. Coarser specimens show considerable quartz content, >50%. Yellow-orange stain coats many of the cuttings. Possibly Bandelier Tuff, pumice bed of Tshirege Member.

Comments: 0-75m, very hard hammer drilling.
75-129m, soft, fast-drilling,
no water made or lost in hole.

P m r
19-8-79
J.

Lith log 847-10

0- 50' Regolith composed of clays, altered biotite some hornblende and qtz. Probable source Rock Qtz. latite

50'-70' Porphyritic Biotite bearing, Hornblende Qtz latite, still has clay component. ≈ 10-15%

70-300' Por. Biotite bearing Hornblende Qtz latite.

γ 150 cps

Lithologic log 847-11

0-50' porphyritic Biotite Hornblende bearing Qtz. latite

60'-100' porphyritic Hornblende-Biotite Qtz. latite

100'-160' porphyritic Hornblende bearing Biotite bearing Qtz. Trachyte

160'-180' porphyritic Hornblende Biotite bearing Qtz. Trachyte with some signs of alteration (iron stain and some psilomelane)

180'-200' porphyritic Qtz. trachyte some signs of alteration

200'-220' porphyritic Qtz trachyte

220'-300' por. Biotite-bearing Qtz trachyte

→ Fe_3O_4 in significant quantities ≈ 3-5%

& 150 cps.

Hbld = Hornblende

Lith log 847-12

10'-20' Biotite, Hornblende bearing Qtz. Trachyte, High clay content

20'-50' SAME AS ABOVE. Clay content down to ≈ 2%

50'-60' More aphanitic with loss of Biotite & Hbld., phenocrysts ARE less abundant

60'-90' porphyritic Biotite, Hbld. bearing Qtz. Trachyte

90'-100' Slightly more aphanitic lesser amount of Hbld & Bi.

100'-160' por. Biotite Qtz trachyte

160'-300' por. Hbld & Biotite bearing Qtz. trachyte

Fe_3O_4 present in All above

& 150 cps.

8-16-79

J.[3]

Lith log 847-14

0-130' Porphyritic Biotite bearing Qtz latite. Some pyroxenes (Augite)

130'-150' Por. Qtz latite some biotite & pyrox.

150'-190' Por. Bio. bearing Qtz. Latite with pyrox.

190'-230' Por Pyrox- Bio. Bearing Qtz Latite

220'-280' Darker ground mass Por. Qtz. Trachyte Slightly vesicular

Slight increasing Ammounts of vesicular gas pockets

with increase in depth to 280'

γ 150 cps

Project	Jemez
Hole	847-15
Location	SE¼ NW¼ SE¼ 27 21N 3E
Elevation	9180'
Method	Foam
Dates	9-25-79
&	

Depth	Description
0-48 m	Pale orange to brown tuff with abundant euhedral to anhedral quartz. Some bipyramidal quartz. Quartz up to 25% by volume
48-92 m TD	Pale orange claystone, siltstone and fine grain sandstone. Sandstone shows predominantly quartz grains in orange (clay) matrix.
Comments &	Upper unit is interpretted to be Tshirege member of Bandelier Tuff. Lower unit is interpretted to be Abiquiu "Tuff". No significant groundwater encountered. Assumed subsaturated.

Project	Jemez
Hole	847-16
Location	SW¼ NE¼ NE¼ 33 21N 3E
Elevation	9050'
Method	Foam
Dates	9-25-79
γ	

Depth	Description
0-92m TD	Gray-brown tuff with abundant (~25%) euhedral to anhedral quartz, some of which is bipyramidal.

Comments: Drilled blind 25-97m TD. Lithology assumed to be constant to bottom hole based on penetration rate. No significant water encountered; assumed subsaturated. Interpretted to be Tshirege member of Bandelier Tuff.

Project Jemez
Location NE¼ SE¼ SE¼ 2 18N 4E
Hole 847-17
Elev 9050'
Dates 8-8- 8-10-79 (mechanical problems, Rig down ~1 full day)
$\gamma \sim 120$

depth (m)

0 - 9 Regolith composed primarily of tuffaceous material whitish in color, mixed with soil & clays. tuff has some phenos of qtz and plag.

9 - 36 Whitish tuff as above without well defined soils and clays (Color also grey, grey-blue, yellowish

36 - 42 Tuff with significant quantities of FeS_2

42 - 48 Dark grey fine grain (aphanitic) with some feldspar phenos (small) Latitic - Andesitic

48 - 90 lighter grey with some phenos of plag. and pyroxene (augite - hypersthene) ≈ Andesitic lots of FeS_2 pyrite

Comments: drilled easily Rotary-Air noticable water at ~ 40' for the duration of the hole

Project	Jemez
Hole	847-18
Location	SE¼ NE¼ NE¼ 2 18N 4E
Elevation	9180′
Method	Foam
Dates	9-7 → 9-7-79
γ	~ 120 cps

Depth	Description
0-14 m	50% clear, subhedral to anhedral quartz ; 50% fine grain andesitic(?) lava fragments and pumice.
14-27 m	75% quartz as above ; 25% pumice and felsite
27-92m TD	10% quartz as above ; 90% felsite and pumice. Pyrite from 45-97m disseminated and as veins.

Comments : No significant water encountered. Assumed subsaturated. Interpretted to be very silicic, poorly welded lithic-crystal tuff. Possibly Bandelier tuff.

847-20

Project Jemez
Hole 847-20
Location NE¼ SE¼ NW¼ 11 18N 4E
Elev 8680'
Method air, rotary
Dates 8-10 — 8-10 easy drilling
$\delta \sim 120$

depth (m)

0 - 9.1 Regolith composed of volcanic debris, Andesite and some Latite porphyritic with sandine, Qtz, plag., No mafics visable ground mass dark grey to greenish

9.1 - 24 Same lith as above but decrease in alteration and soil present in samples. Also present is an almost aphanitic dark grey lith. (Latitic)

24 - 72 Appearance of Rhyolitic tuff debris with Andesitic and Latitic fragments mixed in. Alot of Qtz. phenos in tuff ≥ 50% decreasing abundance of Andesitic and Latic Xenos as you progress down hole

72 - 87 Darker grey porphrytic - aphanitic Andesite - Latite Qtz, sandine, plag, hornblende much more competent rock than in previous interval.

87 - 90 TD White-yellowish well lithified, very fine grain, felsite (Rhyolitic) well Lithified tuff

Comments: drilled in ~ 5 hrs, no excess water observed

Project	Jemez
Hole	847-21
Location	NE¼ NW¼ SE¼ 10 18N 4E
Elevation	8680'
Method	Foam, Hammer 22-97 m
Dates	9-11 → 9-11-79
γ	~ 120 cps

Depth	Description
0-21 m	Mixed silicic volcanic material. Very low color index & white to light gray. Fine grain to aphanitic. Material is low density lava and pumice. Most cuttings are mineralized with very fine grain, euhedral pyrite. Feldspar alteration imparts blue-green color to some cuttings.
21-92 m TD	Gray-green to gray-purple andesite with pyrite cubes as in above unit. Fine grain groundmass, 10% plagioclase phenocrysts. Accessory green clinopyroxene laths, to 1 mm length. Occassional cuttings in which phenocrystalline feldspar is 50% whole rock volume.
Comments &	Upper unit interpreted to be lower (Otowi) member of Bandelier tuff. Lower unit interpreted to be lower member andesite of Paliza Canyon formation as indicated for the surface geology by Smith, Bailey, + Ross.

Project Jemez

Hole 847-22

Dates 9-14 → 9-15-79 Location SW¼ NW¼ NE¼ 10 18N 4E

Method Air, rotary hammer

Elevation 8900'

$\gamma \sim 120$

Depth (m)

0 – 3m Soil & Regolith composed of high organics and highly altered volcanics

3m – 33m Medium grey slightly porphyritic to mod fine grained latitic to andesitic. Plag alkali feldspars, some small indistinguishable mafics, qtz with pyrite inclusions seen.

33m – 76m darker greenish fine grain slightly porphyritic Andesite some feldspars and pyroxenes visable, pyrite visable

76 – 92m back to the grey variation

Comments:

Project Jemez
Hole 847-23
Location SW¼ SW¼ SW¼ 10 18N 4E
Elevation 9360'
Method Foam
Dates 9-17 → 9-17-79
δ

Depth	Description
0-68 m TD	Very loose, white lapilli tuff. Low density 10-20% of lapilli light enough to float in water. Abundant subhedral quartz. Fine grain purple-gray lava at 64-68 m is interpretted to be xenolith material.

Comments : No significant water encountered. Assumed subsaturated

Project	Jemez
Hole	847-25
Location	NW¼ SW¼ SW¼ 18 18N 4E
Elevation	9080'
Method	Foam / hammer
Dates	9-18 → 9-18 -79
γ	~120 cps

Depth	Description
0-7 m	Subequal amounts of lava fragments, quartz, and clay. Lava fragments are light to dark gray and red where oxidized and aphanitic to fine grain.
7-92 m	Volcanic lava flow as above. Occassional feldspar and pyroxene phenocrysts visible < .5 mm, but otherwise fine grain to aphanitic. Some green amygdaloidal minerals at 80 m.

Comments: No significant water encountered. Assumed subsaturated. Upper unit colluvium. Lower unit interpretted to be andesite of Paliza Canyon Formation.

Project Jemez
Hole 847-28
Location SW¼ SW¼ SW¼ 6 18N 4E
Method air, (rotary to 80'), (hammer - 800')
Dates 8/21 - 8/21/79
Elev 8380'

Depth (m)	
0 - 6	Forest Duff, Regolith composed primarily of lapilli tuff
6 - 27	Whitish tan lapilli tuff with ≈ 10% Qtz, Also some minute hornblende crystals visable, Some feldspars also distinguishable
27 - 91	medium grey crystal tuff with Abundant Qtz crystals (≥ 50%). Mafics less visable Some feldspars present

Comments:

Project	Jemez
Hole	847-29
Location	SE¼ SE¼ NE¼ 16 18N 4E
Elevation	9320′
Method	Foam 0-50m rock bit 50-97m TD Hammer
Dates	9-11 → 9-12-79
γ	~ 120 cps

Depth	Description
0-12m	Loose, very porous white lapilli tuff. Pumice lapilli are aphanitic except for a few percent very fine grain mafics and small clusters of white fine grain feldspar.
12-45m	Mixed silicic volcanic material & silicic (rhyolitic?) fine grain lava and pumice, sanidine, and quartz in approximately subequal volumes. Some quartz characterized by euhedral bipyramids, but in general quartz is difficult to separate from sanidine. Some of the pumice fragments contain small crystals of biotite and hornblende only visible with the hand lens. Some of the euhedral quartz crystals contain very small pumice fragments and may indicate crystal growth after deposition and while cooling in the still hot volcanic ash.
45-92m TD	Purple, fine grain - aphanitic andesite with accessory green clinopyroxene and plagioclase.

Comments : Upper unit interpreted to be Tshirege member of Bandelier Tuff. Middle unit is interpreted Otowi member of Bandelier Tuff. Lower unit is interpreted to be lower member andesite of Paliza Canyon Formation. Pumice, quartz, and sanidine that occassionally constitute significant part of cuttings in the bottom unit are interpreted as accidental washout material from the fragile top unit. They are not phenocrysts in the andesite.