

Sandia National Labs R001

- 50' 50 % white to light brown pumice lapilli and bombs. Mostly quite fresh, with local Fe-staining
- 40 % Gray to black, fine grained hypocrySTALLINE to holohyaline siliceous lava clasts. Textures are quite variable, much of this is quite vesicular. This material is mostly quite fresh but locally Fe-oxide stained. Much of this material is drill broken, suggesting bomb or block size in situ.
- 10 % Dark gray to black, hypocrySTALLINE basalt clasts, locally vesicular.
- 60' 95 % White to light brown pumice as above.
- 5 % mixed lithic clasts as above
- 70' 85 % Dark brown lapilli size clasts of highly vesicular basaltic glass with palagonite rinds. This material is quite hard in the center of each clast. Some clasts contain unidentifiable vapor phase minerals in the vesicles.
- 10 % Dark gray hypocrySTALLINE, microporphyrific basalt, locally vesicular. This material is locally Fe oxide stained, occasionally with much secondary hematite. These are drill broken and may represent bombs or blocks.
- 5 % siliceous clasts as above.

Sundia National Labs RDO-1

80'	30%	Palagonite lapilli tuff a/a
	70%	Various Gray to black hypocrySTALLINE to holohyaline lithic clasts of variable texture and composition. Much of this may be up hole slough from trapping.
90'	90%	Highly vesicular basaltic glass lapilli with palagonite rinds as above.
	10%	Variable lithic clasts as above.
100'	a/a	Fragments somewhat smaller (~1-3 mm)
110'	a/a	
120'	95%	2 to 4 mm lapilli of highly vesicular basaltic glass w/ palagonite rinds. This material appears to be slightly porphyritic. Vapor phase minerals are common in the vesicles.
	5%	Dark gray hypocrySTALLINE basalt lithic clasts. Locally Fe-oxide stained, locally with secondary hematite.
130'	25%	Basaltic Palagonite tuff as above
	75%	Siliceous volcanic material consisting mostly of grayish fine grained hypocrySTALLINE to holohyaline rhyolite, with minor white pumice. Some of this could be slough.

Sandria National Labs RDO-1
obsidian

140'	75%	Medium gray volcanic glass with slight color variations and occasional banding. This appears to be locally pumiceous.
	25%	up-hole slough.
150'	85%	Medium gray to dark gray volcanic glass ^{obsidian} . About half of this material is finely very vesicular.
	15%	up-hole slough
160'	a/u	
170'	90%	Medium gray to dark gray banded obsidian. This material is mostly massive, with less than 10% pumiceous component.
	10%	up-hole slough
180'	95%	Obsidian a/u
	5%	slough
		Note: change to 20 foot samples
200'	a/u	noticeably banded; locally w/ stretched vesicles.
220'	99%	obsidian a/u
	1%	slough

Sandia National Labs RDO-1

240'	50%	Gray massive obsidian with locally laminations ^{finely banded} as above. This locally appears finely crystalline
	49%	Light gray pumiceous obsidian - part of the same material as above.
	1%	slough
250'	85%	Gray massive obsidian a/u
	15%	Light gray pumiceous obsidian a/u
260'	a/u	w/ 90% glass, 10% pumice v. minor uphole slough
270'	a/u	
280'	50%	Light to Dark gray, ^{banded} finely laminated obsidian. Laminations are increasingly common. This glass occasionally contains fine ^{small} plate needles.
	40%	Pumiceous glass from the above unit.
	5%	uphole slough

N.B. There are traces of very soft dark green phyllosilicate (?) occurring on some surfaces. This, in one case noted, is associated w/ what appears to be a zeolite coating the same surface.

Sundin National Labs RPO-1

290'	80%	Light gray fine pumice, associated w/ the obsidian
	18%	Massive obsidian a/a
	2%	uphole slough
300	a/a	
310	90%	PUMICE
	10%	OBSIDIAN
320	90%	Orange to gray fine grained, fine ves
	10%	clasts, gray to black a/a
330		same as above
340		same as above
350		same as above
360	95%	fine grained - gray
	5%	clasts - brown
370	90%	dark vesicular brown to black glass (obsidian) with small sized clasts. Sparse bit rounded pale yellow opx phenocrysts, less abundant dark green opx and plag w/ inclusions. Vesicles common, & bit of amorphous white material. Occasional little attached. Some clasts were gray & did have glass & brown.
	10%	gray pumice - larger size - presumably from top hole

SANDIA NAT. LABS RPO-1

- 390' same as above
- 410' same as above
- 430' 89% as above - mostly glass
11% very gray obsidian
- 450' 80% basaltic lapilli
20% very fine grained glass
- 470' 95% basaltic lapilli - some very brown glass
5% very gray obsidian
45% about the same as above
- 490' same as above
- 510 95% Dark brown, finely vesicular microporphyrific basaltic glass. Phenocryst assemblage includes clear plag. (~.5mm) and pale yellow opx, with minor green-brown opx. Vesicles are common. Lined or filled w/ clear to white, cryptocrystalline or amorphous material.
This material is somewhat pristine w/ no palagonite.
- 570 Gray to dark gray fine aphanitic, microporphyrific microvesicular basalt/scoria. Presumably from the same unit as the glass.
- NB. It is difficult to determine the size of clasts in situ.

SANDIA NATIONAL LABS RDO-1

530'	a/a	
550'	70%	Dark brown microvesicular porphyritic basaltic glass as above.
	23%	Dull gray very fine aphanitic finely vesicular basalt.
		Note: these are both part of a relatively unaltered basaltic tuff. No palagonite is present. The fine aphanitic material probably represents bombs or other larger clasts.
	2%	slough
570	a/a	slightly higher % glass
580	a/a	Note: some of these clasts contain vesicle coatings of a dark green clay (chlorite?). Magnetite appear to be stable. Traces of primary pyrite (vapor phase?) are present on vesicle walls of some of the phytic clasts.
600-660	a/a	95% D/BN MICROVESICULAR PORPH. BASALTIC GLASS 5% SLOUGH
680, 700, 740	a/a	APPEARS FRESHER THAN ABOVE (LESS CHLOROPHANEITE (?)) AUGITE PHENOS UP TO 2 MM, OLIVINE FRESH, SLIGHTLY ALSO GRAY TO BROWN WHERE PREVIOUSLY IT WAS BN.
760, 780, 800	a/a	1

Sandra Nat. Labs R00-1

820

75%

Dark brown to greenish brown finely vesicular microporphyrific basaltic glass
Vesicles are often filled by secondary minerals or vapor phase minerals. Rock is quite fresh w/ no alteration. (As above)

25%

Medium to dark gray fine aphanitic finely vesicular basalt. There is a variety of textures included in this group. Occasional clasts show in ~~the~~ vesicle coatings of fairly soft dark green amorphous material.
~~Some show~~

Note - clasts of both groups show ~~some~~ occasional soft green vesicle linings. Some show soft exln material in vesicles as well. The phytic material is clearly represents accidental fragments in the tuff, both can be seen in a single drill chip occasionally.

20

~~870~~

a/a

40

~~960~~

aa

60

~~880~~

a/a

880

~~900~~

a/a

phytic material down to 10%

Some of the phytic fragments exhibit pervasive greenish clay alteration, often through out only 1/2 of the clast.

00

920

a/a

Sundra National Labs R00-1

20
940

a/p

10
960

90%

Dark brown ^{finely} ~~matrix~~ vesicular basaltic glass
as above, ~~some~~ A few clasts show
a ^{Fe-}orange brown pervasive oxidation.

10%

Pyrite fragments as above

60
980

A/A

It appears as if there are minor
siliceous pyrite fragments included within
this interval

980
~~1000~~

a/p

00
1020

a/p

NB there is an increase in the
amount of greenish clay alteration,
~~as well as an overall increase~~
there are a few fragments of clay rich
volcanic sandstone w/ fine disseminated
pyrite.
Presence of subhedral euhedral silica
in some sections (fresh/biotite?)

10
1030

20% a/p

80%

Various volcanic sediments ranging from
sandy siltstones to ~~matrix~~ clay rich sandstones
This material ranges from fairly soft to
moderately indurated. Most of the lithic
and mineral fragments appear to be somewhat
altered, ~~however fresh appearing~~ - this
material is locally pyritic

Silica veining is present in minor amounts
clear calcite

SNL RPO-1

1020
~~1040~~

95%

Brownish gray to gray clay rock fine grained volcanic sandstone, moderately indurated. Locally pyritic (minor)

Secondary calcite occurs as vein fillings

1030
~~1050~~

80%

AA

20%

fine ~~massive~~ finely indurated mudstone

1040
~~1060~~

80%

Greenish to brownish gray moderately indurated mudstone ^{or} siltstone. This is finely laminated w/ occasional sandy layers, and is locally fissile. Vein fillings of calcite ~~and quartz~~ (see table), often in dark green outer zones.



... silt is dark adjacent to filling.

20%

clay with volcanic s.s. as a bone

NB. There is a lot of clay from this interval which is being lost to the drilling fluids

SANDIA NATIONAL LABS RDD-1

- 1045 85% very soft greenish gray silty clay.
 10% casing cement (Light brown, calcareous)
 5% moderately indurated fine volcanic sediments including clay rich sandstones and sandy siltstones.
- 1050' a/p w/ ~20% up-hole slough of basaltic tuff.
- 1060 shaker sample - same material a/p w surface contamination.
- 1070 NS
- 1080 NS
- 1090 90% white to very light gray dehydrated siliceous crystal lithic tuff. This rock is composed of white fairly soft cryptocrystalline matrix w/ 5-10% sub mm euhedral to subhedral plagioclase crystals, and ~5% euhedral hexagonal plates of bronze colored pyrrhotite. Relic clastic texture is visible. Localized calcite is present, not as veins.
- 10% up-hole slough
- 1100 80% a/p w/ increase in % of pyrrhotite to ~1%.
- 15% light to medium gray siliceous dehydrated tuff to nearly pure cryptocrystalline silica. This material is somewhat variable and ranges from where the clastic texture is visible to where it is uniform w/out texture. This may represent fracture controlled silica metasomatism.

Sandia RDO-1

- 1110 a/a w/ less silica metasomatism. Texture is changing indicating a higher content of lithic lapilli clasts. Pyrochloite is decreasing, and pyrite is starting to be more common, usually as fine disseminations or sub mm aggregates. Still slightly calcareous locally. Relic pumice textures visible.
- 1130 a/a Fine bedding is visible in some clasts, flattened pumice textures are present.
- 1150 30% White to very light gray devitrified altered tuff as above, occasionally has a greenish tinge. Appears locally to be a tuff breccia.
- 70% Greenish to reddish gray altered lithic fragments, of variable textures, from the above tuff. These clasts range ~~in size~~ from lapilli to probable bomb size. Hardness varies from fairly soft to quite hard. Many have fine disseminated pyrite. The above tuff coats many surfaces. Vugs are filled w/ pyrite, drusey quartz, minor calcite, or probable tr. heulandite. No clear associations.
- (of siliceous lava)
- Some surfaces are coated w/ light greenish clay. Cryptocrystalline silica occurs as a vein filling.
- pyrochloite still present in minor amounts
- 1170 a/a

1190

50%

white to light greenish white devitrified, moderately indurated ext. lithic tuff. The matrix can be easily scratched w/ the probe. Common primary crystals include quartz and feldspar, secondary minerals include cryptocrln SiO_2 , greenish clays, minor precipitated chlorite, magnetite, traces of hematite (?), calcite, traces of apparently precipitated epidote, and traces of pyrite or pyrobitite.

50%

Various greenish to reddish gray lithic clasts of apparently mostly siliceous composition. These show variable degrees of alteration. Secondary minerals include cryptocrln silica, pyrite, chlorite (on surfaces and after terrigenous), calcite, traces of epidote (after plaq), and locally hematite.

1210

u/a

w/ higher proportion of lithic clasts

1230

u/a

w/ proportion of tuff back up to 50+%. The tuff matrix is richer in small sub mm lithics here, and generally softer. The occurrence of chlorite and epidote has dropped off.

NB This was a very clay rich zone upon sampling.

1250

90%

Medium to dark gray, fine aphanitic, sparsely plaq porphyritic flow rock probably of dacitic or rhyolitic composition. The rock appears quite glassy in places. It locally shows finely disseminated pyrite or magnetite. There are a few fracture surfaces on the rock which show apparently precipitated chlorite on the outside of the fracture and tabular calcite on the inside. There are possible roots involved also. There are also traces of hard white cryptocrln silica and clear botryoidal silica (β cristobalite?).

10%

slough

- 1270' 80% Lithic clasts of variable composition, texture, and degree of alteration. Many are pyritic, and many show surface coatings of calcite, chlorite, and occasionally ~~quartz~~ quartz or β cristobalite. Many show chlorite in voids and after sericite. Plagioclase is usually clear, magnetite is commonly present, occasionally with hematite stains surrounding.
- 20% Gray to brown gray, variably indurated crystal lithic tuff. The tuff is obviously clastic with quartz and plagioclase crystals along with lithics. Cryptocrystalline silica, quartz, calcite, chlorite, green clays, magnetite, and minor hematite are present as secondary minerals.
- N.B. this interval contains a fair amount of glauconitic calcite and apparently precipitated chlorite throughout. No epidote was observed.
- 1280 a/p w/ quite an abundance of hydrothermally precipitated chlorite and calcite, and an increase in the intensity of pervasive alteration of the lithic clasts

1290

1290

60%

Gray to brown gray, hard, aphyric rhyolitic "dotted" lithic fragments. This material is devitrified and clay altered. Very sparse mm. clay planes are altered to clay ± chlorite (?) Many fracture surfaces are covered w/ calcite and soft botryoidal chlorite, and occasionally cryptocryst. SiO₂. There are traces of pyrite in the vein fillings also. Traces of magnetite occur in the rhyolite. Pyrite occurs in the rhyolite adjacent to fractures occasionally.

20%

Other lithic fragments w/ similar alteration.

10%

Whitish to greenish white ext and lithic tuff matrix. Texturally variable, obviously clastic. Clay, chlorite, calcite, silica, and pyrite are present in the matrix also, and appear to be precipitated.

Traces of orangish hematite (?) present.

* 1310 a/p
see other description

w/ less tuff matrix, same alteration/precip. minerals are present, but abs. of the clasts. Possible fine white zeolite ass. w/ chlorite in vugs.

1320 a/p

w/ 15% white devitrified indurated tuff matrix. Chlorite is sparse in this matrix, but still present in the clasts. Note: much of the magnetite present here is going to hematite.

1330 a/p

w/ 40% tuff, precipitation minerals have decreased, lithic clasts appear more siliceous

There is a hard white fibrous satiny mineral ass w/ calcite. (SiO₂ species?)
[sampled @ 1310]

1310

75%

Dark brownish gray, fine grained, very hard, glassy, silicic flow rock or welded tuff. This rock has a fair amount of chlorite precipitated in voids, as well as an alteration product presumably of ferromagn. Plug is clear and fresh appearing. There is locally traces of hematite around chloritized ferromagn and plug sites.

25%

Other lithic clasts of similar alteration, fragments of tuff matrix as above. The tabular calcite and soft botryoidal precipitated chlorite do not appear to be present.

1320

1340 90% Reddish gray to gray mostly siliceous lithic clasts of variable texture and composition state of alteration is somewhat variable though most are quite hard. Some of these may be welded tuff. Many show chlorite and calcite ± cryptocrystalline SiO₂ in vugs and on fractures. Many show bright orange hematite after staining around phenocrysts magnetite occurs locally. Pyrite present locally. ~~Trace of~~ epidote after plagioclase is noted on a few clasts.

107% white to greenish white to pinkish white variably indurated devitrified ext lithic tuff matrix. Precip. minerals not obvious. chlorite noticeable in small amounts.

1350 60-70% Lithic clasts as above w/ few precip. minerals -

Transitional between non-welded above and welded below

40% Greenish white to pinkish white devitr. f. ext variably indurated ext lithic tuff. much probable fine disse. hematite locally. light greenish clay fairly common usually in small lithic clasts. Minor botryoidal masses of soft fibrous zeolite(?) on some fractures in the tuff. Occasional sub mm euhedral magnetite are present. Chlorite very present - trace amounts.

1360 40% a/f

60% Purple gray welded ext lithic tuff. This unit is quite hard. Porphyritic w/ sub mm plag, qtz, and px ext. sparse magnetite euhedra. Pr altered to chlorite. Some surfaces have a dull grey green material with clay or chlorite

1370

90%

Purple gray welded tuff as above.
Precip. minerals are very rare except the
occasional dull green gray surface coating.
Most chlorite, calcite, ^{biotite} etc. are alteration
products of mafic phenocrysts.
Traces of pyrite present, traces of chlorite
in tiny voids.

10%

uphole slough

1380

95%

Tuff n/a

5%

slough

1390