GL04701

			FRAMEWORK GRAINS: MONOMINERALIC GRAINS (AND PERTHITE)										ROCK FRAGMENTS								CEMENT												POROSITY		MISCELLANEOUS					
	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ strained	un-strained	POLXLN. QUARTZ	POTASSIUM FELDSPAR micro-cline	san. or orth.	PLAGIOCL.	PERTHITE	Replace-ment? uper-thite	musc 1		CHERT	SED.	MET.	PLUT.	(felsic) VOLC. granophyric matrix of Otowi				QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYPRITE	FeOx				CLAY RIMS	~~ACCESSORY MINERALS~~ matrix	PRIMARY	SECONDARY	PYRITE (in ma-trix)	MUSCOVITE *				
MATRIX 5Φ 0.031	2	1		//																		𝍸									//	𝍸			11	/				
6.4% 4Φ 0.062	11	2	//	𝍸		/	///															𝍸										𝍸								
4.1% 3.5Φ	7	3		//			///	//														//										𝍸								
4.7% 3Φ 0.125	8	4		///			///	/								/																𝍸								
12.3%	14	5	///	////			///	///		/																						𝍸								
2.5Φ	7	6	/				//	/								//	/															𝍸								
7.6%	6	7	/	/			//	/								/																𝍸								
2Φ 0.25mm	6	8	//				/									//	/															𝍸								
	14	9	///	////			/	///		/						/	/															𝍸								
27.5%	24	10	////	///	///	//	/	//		///						𝍸 /																𝍸								
	9	11	/	/	/	//	/									///																𝍸								
1.5Φ	8	12	/	//		/	/									///																𝍸								
19.9%	6	13	//		/			/								//																𝍸								
	11	14	𝍸	///			/									//																𝍸								
	5	15	/	//	/											/																𝍸								
1 ~~1~~Φ 0.5 mm	4	16	//													//																//								
	5	17	///	//																																				
	0	18																																						
	3	19		//	/																																			
12.3%	3	20	/													//																								
	1	21				/																																		
	6	22	//	/	/		/									/																								
0.5Φ	3	23	/		/										/ **																									
	3	24	/			/										/																								
	1	25	/																																					
	0	26																																						
4.7%	0	27																																						
	0	28																																						
	1	29	/																																					
	2	30	*L		/											/																								
	0	31																																						
0Φ	1	32														/																								
	0	33																																						
	0	34																																						
	0	35																																						
0.6%	0	36																																						
	0	37																																						
	0	38																																						
	0	39																																						
	1	40														/																								
	0	41						(289)		⑱																														
		42																																						
			39	35	10	8	23	14		5	1				1 (3%)	33 (89%)	3 (8%)					12									2	77			2	1				

(94)

84 (49.12%)

50

37

TL = 171

0.5-1Φ

154

171 ① 0.6%

0.69%

NOTES, COMMENTS

FRAMEWORK GRAINS (17~~2~~3 pts)
64.4% OF TOTAL

MATRIX, CENT., ETC.
35.6%

* 14L, 6W

** QTZ-SER. SCHIST

FRAMEWORK GRAINS

22.5% ~~mxln.~~ qtz. (str.)
21.4% qtz. (unstr.)
5.7% polyxln. qtz
} 49.6% ~~[illegible]~~ qtz. ✓

4.6% microcline
13.5% san. or orth.
8.1% plag.
2.9% uperthite
} 29.0% fsp ✓

0.6% met frags
19.1% plut. "
1.7% volc. rock frags
} 21.4% rock frags. ✓

MATRIX:

12.8% OF TOTAL IS CARBONATE (PRESUMABLY CALCITE)

42 gr + micr + mica = 91%
1 other 2%
3 volc 7%

m- 8 17.8
pl. -14 31.1
oth. 23
45

ROCK FRAGS:

2.7% met. frags
8.1% volc. rock frags
89.2% plutonic rock frags.

SAMPLE BACA-6 400-500'
NUMBER OF POINTS COUNTED 250 (268)
MAGNIFICATION 65X (TT)
DATE 04/19/85

1 DIVISION = 0.031 m

TL, JH

159

///// ///// ///// ///// ///// ///// ///// ///// ///// / 278-2826
///// ///// ///// ///// ///// ///// ///// ///// ////

530-2759

FRAMEWORK GRAINS

			MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR S/b m	PLAGIOCL.	PERTHITE	mica			CHERT	SED.	MET.	PLUT.	VOLC.			
5ϕ		1			/													1
4.5ϕ ④	4 2.7	2	////(2)		////(2)	consider ½ as matrix												2
4ϕ ⑪	11 7.3	3	//		///// //	/								/				3
3.5ϕ ⑩	10 6.6	4	/////		////									/				4
㉒	10 14.6	5	////		///// /													5
	12	6	///// /		///	//								/				6
3ϕ ㉓	11 15.2	7	///// ////		/									/				7
	12	8	///// ////		/	/									/			8
2.5ϕ	8	9	///	/	// /	/												9
㉞	10 22.5	10	////		///	/								/				10
	8	11	/	/	// /	//									/			11
	8	12	//		// //									//				12
2ϕ	5	13			/	//								//				13
	4	14	///											/				14
㉖	6 17.2	15	//	//	/									/				15
	3	16			/ /									/				16
	8	17	/	/	/	//								///				17
1.5ϕ	1	18			/													18
	1	19			/													19
	3 6.6	20	/		/	/												20
⑩	1	21	/															21
	1	22													/			22
	2	23		/										/				23
	1	24			/													24
1ϕ	1	25			/													25
		26																26
	1	27			/													27
	4.6	28																28
⑦		29																29
	1	30												/				30
	1	31			/													31
	1	32			/													32
	2	33	//															33
		34																34
0.5ϕ		35																35
		36																36
	2.7	37																37
④		38																38
		39																39
		40																40
	1	41			/													41
		42																42
0ϕ	3 ——▷	47-1					5							45-11				43

TL = (151)

[illegible] 57 ⑥
41.7% (63) QTZ

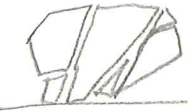
(42) (11) 13
(53) — (66 FSP)

19 3
(22 RF)

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	ADULARIA?	CHLORITE		CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS MICA			
///	///// ///// ///// ///						///	///				///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// /////			/////			
												+5@ Aa >5ϕ						
3	18						3	3				85			5			

NOTES, COMMENTS



many grains clearly broken, rehealed with calcite cement (want picture?)

most grains are extremely angular – many (esp. smaller) are elongate

minor (<0.3% diss. epidote/allanite replacing matrix – dk, commonly semi-opaque, sl. reddish brown aggregates up to 0.25 mm in max. dimension.

31.7% MATRIX
10.0% MONOMINERALIC CEMENT
1.8% COARSE MICA
56.5% FRAMEWORK GRAINS (SAND SIZE) PLUS COARSE SILT)

pl-13
m-11
oth-42
66

35 gr + ucl. + mica = 92%
3 vok = 8%

SAMPLE BACA 8 - 1600-1700'
NUMBER OF POINTS COUNTED 268
MAGNIFICATION 40X
DATE 05/02/85

JH

1.41 2

FRAMEWORK GRAINS																		CEMENT													POROSITY		MISCELLANEOUS			
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS																										
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR Ⓜ	PLAGIOCL.	PERTHITE	MICA			CHERT	cal SED.	MET.	(granitic) PLUT.	- VOLC.	older ss			QUARTZ	CALCITE	DOLOMITE	hem ~~SIDERITE~~	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				
	1	卌 卌		卌 |||	||			卌						1	1	卌	卌	卌					卌		卌													
	2	卌 卌		卌			卌									卌					卌		卌														
	3	卌 卌		卌												卌					卌		卌														
	4	卌 卌		卌															卌		卌														
	5	卌 卌		卌															卌		卌														
	6	卌 卌		卌															卌		卌														
	7	卌 卌		卌															卌		卌														
	8	卌 卌		卌																		卌														
	9	卌 卌																			卌														
	10	卌 卌																																					
	11																																			
	12																				49															
	13																		36																	
	14																																			
	15																	86																		
	16																																			
	17																																			
	18																																			
	19																																			
	20																																			
	21																																			
	22																																			
	23																																			
	24																																			
	25																																			
	26																																			
	27																																			
	28																																			
	29																																			
	30																																			
	31																																			
	32																																			
	33																																			
	34																																			
	35																																			
	36																																			
	37																																			
	38																																			
	39																																			
	40																																			
	41																																			
	42								(4.4%)	2.2%																												
		100		40 3	2	1	12				1	1	7	15	5																					

(57%)

46

F/RF= 1.58

29

7 "other" = 24%
7 gran = 24%
15 volc = 52%

w/microcl. 7 other = 21%
7 gr + 2 mic = 29%
15 volc = 50%

22 gr + μcl + mica = 50%
7 other 16%
15 volc 34%

NOTES, COMMENTS

matrix "A"
卌 卌
卌 卌
卌 卌
卌 卌
卌 |

46

70

matrix B
卌 卌
卌 卌
||||

24

ss
卌 卌
卌 卌
卌 卌
卌 卌
卌 卌
卌

2

mudstone
卌 卌
卌 卌
卌 |||

ls
卌
卌
|||

siltst
卌 |

SAMPLE B12 460-470'
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE:

225

X + 0.61X = 120
X

1.61X = 120 74.

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE): MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	m	PLAGIOCL.	PERTHITE	ROCK FRAGMENTS: CHERT	SED.	MET.	PLUT.	VOLC.	CEMENT: QUARTZ	CALCITE	PY ~~DOLOMITE~~	hem ~~SIDERITE~~	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY: PRIMARY	SECONDARY
	1	卌 卌		卌 卌	卌	||||				卌	卌 卌	||||	|	卌	|	|								
	2	卌 卌		卌	卌					|	卌 卌			卌										
	3	卌 卌		卌	||						卌 卌			卌										
	4	卌 卌		||||							卌 卌			卌										
	5	卌 卌									卌 卌			卌										
	6	卌 卌									卌			卌										
	7	卌 卌									|			卌										
	8	卌 卌												卌										
	9	卌 卌												卌										
	10	卌 卌												卌										
	11	卌 卌												卌										
	12	卌 卌												卌										
	13	卌 |||												卌										
	14													||										
	15												1	6		1								
	16																							
	17																							
	18																							
	19																							
	20																							
	21																							
	22																							
	23																							
	24																							
	25																							
	26																							
	27																							
	28																							
	29																							
	30																							
	31																							
	32																							
	33																							
	34																							
	35																							
	36																							
	37																							
	38																							
	39																							
	40																							
	41																							
	42																							
		128		24	12	4				6 (.09)	56 (.85)	4 (.06)												

(55)

36

40 (0.17)

F/RF = 0.61

6 ⑦ 68 ⑧ 66 (28%) 4 ⑦

234

NOTES, COMMENTS

matrix A
卌 卌 卌

(19)

matrix B
||||

SAME

SAMPLE B19 1460-1480B (SS
NUMBER OF POINTS COUNTED 300
MAGNIFICATION ______
DATE ______

crs
phengite

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE)

ROCK FRAGMENTS

CEMENT

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	~~MONOXLN.~~ QUARTZ	~~POLYXLN. QUARTZ~~ microcline	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	hem	mus	bte	CHERT	SED.	MET.	PLUT.	VOLC.			QUARTZ	CALCITE	~~DOLOMITE~~ sph	~~SIDERITE~~ hem	~~GYPSUM~~ chl	~~ANHYDRITE~~	FeOx	py		CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS
		79	10	64	5	5		6	13				10	19			6	36		21											

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

63

19

79

84

29

192

NOTES, COMMENTS

matrix A

48

matrix B

39 μcl + gr + mica = 67%
19 volc = 33%
58

hem CO₃ ss

ss

5/75

SAMPLE B20 1300-1320
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE) MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR M	PLAGIOCL.	PERTHITE	MICA			ROCK FRAGMENTS CHERT & SiO_2	SED.	MET.	PLUT.	VOLC.	~~mica~~		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		(133)		30 (41) 11	(6)	~~X~~	3			1		2	12 23 11	18 → (33) 44			
		(62% QTZ)		(22% F)						(.09) .07			(0.36) 52	(0.55) 41	(16% RF)		

CEMENT

QUARTZ	CALCITE	DOLOMITE	~~SIDERITE~~ chl	~~GYPSUM~~ sph	~~ANHYDRITE~~ KF	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	SECONDARY	MISCELLANEOUS			
6	12																	

(M)

NOTES, COMMENTS

MATRIX "A" Mat

(5)

MATRIX "B"

Trace FLUORITE — intergrown w/ calcite cement irreg. masses up to 0.15 mm length or diameter.

Rare irregular calcite veinlets up to 0.2 mm dia. masses of solid calcite up to at least 3 mm. dia.

26 gr + ucl + mica = 55%
3 other = 6
18 volc = 38%

SAMPLE B22 1780-1800 (52)
NUMBER OF POINTS COUNTED ________
MAGNIFICATION ________
DATE 02/05/86

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
		MONOXLN. QUARTZ	POLXLN. QUARTZ other vn	POTASSIUM FELDSPAR m	PLAGIOCL.	PERTHITE	cry			CHERT	SED.	MET.	PLUT.	VOLC.	grp of fxln qtz	intm volc	
	1	卌 卌	卌	卌 ||									|	卌	卌	||	
	2	卌 卌	卌	卌										卌	卌		
	3	卌 卌	卌	||										卌	|		
	4	卌 卌	卌											卌			
	5	卌 卌	卌											卌			
	6	卌 卌	||											||||			
	7	卌 卌															
	8	卌 卌															
	9	卌 卌															
	10	卌 卌															
	11	卌 卌															
	12	卌 |															
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		116	27	12 2									1	29	11	2	

143

14

200

43

CEMENT													POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	py	An	Fl	CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				
卌							||	|	||			卌	卌	||				
卌												卌	||||					
卌												卌						
|												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												卌						
												||						
16							2	1	2			82	9	2				

21

NOTES, COMMENTS

sph.-ser ⇒ alt. intm. volc.

F/RF = 0.33
RF/F = 3.07

MATRIX = 27.1%
CEMENT = 6.9%
Φ F.G.'s = 66.0%

FRAMEWORK SUMMARY

Φ = 71.5%
F = 7.0%
RF = 21.5%

FELDSPAR SUMMARY
(all KF)

RF SUMMARY

GRF+MIC = 3 = 6.7%
VOLC = 31 68.9%
"CHT" = 11 24.4%
45

GR only 2 - 4.6%
VOLC 31 70.4%
"CHT" 11 - 25.0%
44

SAMPLE S2 VC-2A 256.2'
NUMBER OF POINTS COUNTED 314
MAGNIFICATION 200X
DATE 11/06/87

✓ chlt

		FRAMEWORK GRAINS															
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	felsic-VOLC.	intm Volc		
	1	卌 卌	卌	卌 卌	|||	卌 卌				卌		1 qtz			卌	||		
	2	卌 卌	|||	卌 卌		卌 卌				卌				卌			
	3	卌 卌					卌 ||								卌 卌			
	4	卌 卌													卌			
	5	卌 卌													卌			
	6	卌 卌													卌			
	7	卌 卌													卌			
	8	卌 卌													卌			
	9	卌 卌													卌			
	10	卌 卌													卌			
	11	卌 卌													卌			
	12	卌 卌													|||			
	13																		
	14																	
	15																	
	16																	
	17																	
	18																	
	19																	
	20																	
	21																	
	22																	
	23																	
	24																	
	25																	
	26																	
	27																	
	28																	
	29																	
	30																	
	31																	
	32																	
	33																	
	34																	
	35																	
	36																	
	37																	
	38																	
	39																	
	40																	
	41																	
	42																	
		121	8	25 ~~45%~~ 45.5%	3 5.5%	27 49%				11		1	1	58	2		

129

55

F/RF = 55/73

(15%) 1% 1% 82%

73

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	chl	SIDERITE	GYPSUM	ANHYDRITE	FeOx							PRIMARY	SECONDARY				
卌			卌															

NOTES, COMMENTS

MATRIX "A"

卌 卌 卌

卌 卌 卌

卌 |||

MATRIX "B"

卌 卌 ||

chlt — 11 15.5

int — 2

fels 58 2.8

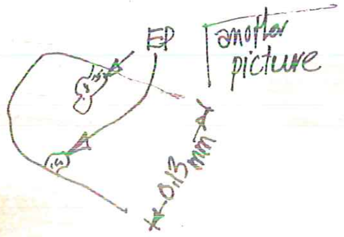
71

AVG. GRAIN SIZE 0.2-MM

RANGE 5μ — 0.8mm

most are ~~0.01 — 0.~~ 0.1–0.4mm

INKED CIRCLE ENCLOSES CLAST W/ DEFINITE PRE-DEPOSITIONAL EPIDOTE (PICTURE)



SAMPLE B4 3700-3800

NUMBER OF POINTS COUNTED 300

MAGNIFICATION 100X

DATE 01/08/86

✓ CW

RECOUNT OF 100 ROCK FRAGMENTS
chert ///// ///// ///// / (16)
felsic volc ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// //// (84)

		FRAMEWORK GRAINS																
		MONOMINERALIC GRAINS (AND PERTHITE)									ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ str.	unstr.	POLXLN. QUARTZ	POTASSIUM FELDSPAR san/or	PLAGIOCL.	PERTHITE (ab repl. san)				CHERT	SED.	MET.	PLUT.	felsic VOLC. (mostly gran.)	alt pumice ??		
	1																	
13	2		//		///	CONSIDER ½ AS MATRIX												
8	3		//		///		/								//			
9	4		///	/	////										/			
11	5		//	/	//		//								////			
10	6		//////		//										//			
6	7		/		//		///											
11	8		///	//	/										////	/		
13	9	//	/////		///		/								//			
9	10	/	/		////										////			
9	11		///		///										///			
12	12		///	/	//		//								////			
13	13	/	///	/	//		//								////			
13	14		//////	/	/		/								////			
12	15	/	///////	/	/										//			
16	16		//////		/		//////								///			
6	17		////		/										/			
4	18			///											/			
6	19		////				/								/			
5	20	/	////												/			
4	21			/											///			
1	22		/															
5	23		///	/											/			
4	24		///												/			
	25																	
2	26														//			
	27																	
	28																	
	29																	
3	30	/													/	/?		
2	31	/					/											
1	32			/														
	33																	
	34																	
1	35															/?		
	36																	
	37																	
	38																	
	39																	
	40																	
	41																	
1	42						/											
1		8	74	13	33		61=1 21								50	3		

201 94 46.7% 54 53 (26.4%) (201)

also 3 and. ppy frags. 2.38 mm 1.61 mm 5.33 mm

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx							PRIMARY	SECONDARY				
////	//									/		///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///						
4	2									1		78						

NOTES, COMMENTS

many microperthite clasts contain allanite-epidote and chlorite xls. & aggregates which terminate at clast boundaries, indicating a pre-S₃ propylitic alteration event (pre 1.09 Ma alteration)

There are a few qtz. overgrowths which might contain fluid inclusions -- worth further study.

Matrix is vf xln aggregate of illite, 2nd silica (qtz.), & silt-clay size clastic debris (?)

FRAMEWORK GRAINS
40.1% monoxln. qtz
6.4% polyxln. qtz > 46.5% qtz

16.4% K-feldspar
10.9% perthite > 27.3% fsp.

1.4% pumice
24.8% granophyre > 26.2% rock frags.

27% MATRIX

27.3% MATRIX
2.1% CEMENT
70.6% FRAMEWORK GRAINS

ROCK FRAGS
5.6% pumice ? (v. altered (obscured)
94.4% granophyre (pum)

SAMPLE B4 3800-3900'
NUMBER OF POINTS COUNTED 287
MAGNIFICATION 40X (ESL)
DATE 04/23-24/85

1 DN. = 0.021 mm @ 40X
" = 0.0084 mm @ 100X

JF

% mm
1.5% 0.021
4.5 0.042
40% 4ϕ 0.063
4.5% 3.5ϕ
10.5%
3ϕ 0.126
8.5%
2.5ϕ
21.5%
2ϕ 0.252
30
%
1.5ϕ
85
14.4%
1ϕ 0.504
4.0%
10
0.5ϕ 0.714
1.0%
0.052
48 = 1.01 mm

✓ cht.

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	FRAMEWORK GRAINS																
		MONOMINERALIC GRAINS (AND PERTHITE)									ROCK FRAGMENTS							
		MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR orth san	micr.	PLAGIOCL.	μ PERTHITE	P.gmite			CHERT	SED.	MET.	PLUT.	felsic VOLC.	intm. VOLC.	C	
	1	𝍸 𝍸	𝍸 𝍸	𝍸	𝍷𝍷	𝍸 𝍸	𝍸 𝍷𝍷	𝍷𝍷			𝍸			𝍸	𝍸			
	2	𝍸 𝍸	𝍸 𝍷	𝍸		𝍸 𝍷									𝍸			
	3	𝍸 𝍸		𝍸											𝍸			
	4	𝍸 𝍸		𝍸											𝍸			
	5	𝍸 𝍸		𝍸											𝍸			
	6	𝍸 𝍸		𝍸														
	7	𝍸 𝍸		𝍷𝍷𝍷														
	8	𝍸 𝍸																
	9	𝍸 𝍸																
	10	𝍸 𝍸																
	11	𝍷𝍷																
	12																	
	13																	
	14																	
	15																	
	16																	
	17																	
	18																	
	19																	
	20																	
	21																	
	22																	
	23																	
	24																	
	25																	
	26																	
	27																	
	28																	
	29																	
	30																	
	31																	
	32																	
	33																	
	34																	
	35																	
	36	also Tr. detrital zircon																
	37																	
	38																	
	39																	
	40																	
	41																	
	42																	
		102	16	33	2	16 (27.6)	7 (12.1)				5			5	25			
		118		35 60.3		58			F/RF =		(14%)		35	(14%)	(72%)			

SIZE	CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
	QUARTZ	CALCITE	chl. ~~DOLOMITE~~	leucox ~~SIDERITE~~	GYPSUM	ANHYDRITE	FeOx							PRIMARY	SECONDARY				
1	𝍸		𝍷𝍷𝍷𝍷	𝍷𝍷															
2	𝍷𝍷𝍷																		
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			

some (< 1%) calcite cement but not counted.

NOTES, COMMENTS

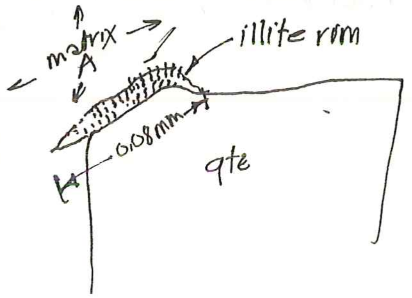
matrix A

𝍸 𝍸 𝍸 𝍸
𝍸 𝍸 𝍸 𝍸
𝍸 𝍸 𝍷𝍷

matrix B

𝍸 𝍸 𝍸 𝍸
𝍷𝍷𝍷

chlorite sparsely replaces a few plagioclase clasts as diss flakes up to 10μ (avg ~5μ) length/dia. and irreg. aggregates of these flakes up to 0.01 mm (also sparsely replaces matrix.



cht. 5
fels 25

OVER ⟹

largest grain: 0.6^{5}mm
smallest 1 ~~4~~ 2
avg. ⟹ 0.1 mm

MOSTLY SUBANGULAR,
but subrnded to angular

SAMPLE BB 2100-2200
NUMBER OF POINTS COUNTED 300
MAGNIFICATION 100X
DATE 01/05/85

///// ///// ///// ///// ///// ///// /////

see other side

✓ chk.

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) — ROCK FRAGMENTS

gr. — ✻

%	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR s/o	m	PLAGIOCL.	PERTHITE	cal-cite	CHERT	SED.	MET.	PLUT.	VOLC. + SiO2	cal-cite
		1													
1.1	5ϕ 4.5ϕ	2													
2.7	5	3	////		/										
2.2	4ϕ 4	4	///		/										
6.6	3.5ϕ 10	5	////		/		//	/						//	
	2	6		/	/										
7.7	3ϕ 11	7	///// //											////	
	3	8	/	/		/									
	2.5ϕ 7	9	///		/	/				/				//	
18.0	7	10	///		//										/
	12	11	////		//	/	/							////	
	7	12	//	/			/			//				//	
	2ϕ 10	13	///// /	/										///	
36.2	~~21~~	~~14~~	~~///// ///// //~~	/	/			/		//				///// /	
	10	15	////	/	/			/		/				////	
	13	16	/////		//			/		//	/		/	///	
	14	17	/		//	//	/	/		/		/ 8-5	///	//	
	1.5ϕ 10	18	/////	/	/	/				/				//	
	8	19	///	/	//									//	
	5	20	//	/	/									/	
21.2	6	21	////							//				//	
	5	22	//	/										//	
	2	23	/											/	
	3	24	///												
	1ϕ 2	25	/	/											
	3	26	//		/									~~(29)~~	
		27													
3.3	1	28		/											
		29													
		30													
		31													
		32													
		33													
	0.5ϕ	34													
		35													
		36													
0.5	1	37	/												
		38													
		39													
		40													
		41													
		42			5/26	(72.2)	(13.9)	(13.9)		(15 "OTHER")					
			(86)	(12)	(25)	(6)	(5)	(5)		(12)	(1)	(1)	(4 plut)		(1)

(98) (36) (48 TL)

1 < 48 = 0ϕ, 96 = −0.5ϕ

TL = (183)

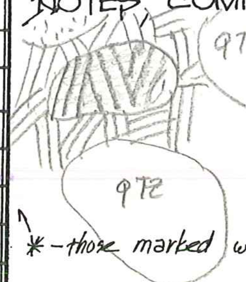
67 − 1 = 1.4 mm

TL = 183

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS
/	///								///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// /////			
(4)									(70)			

NOTES, COMMENTS

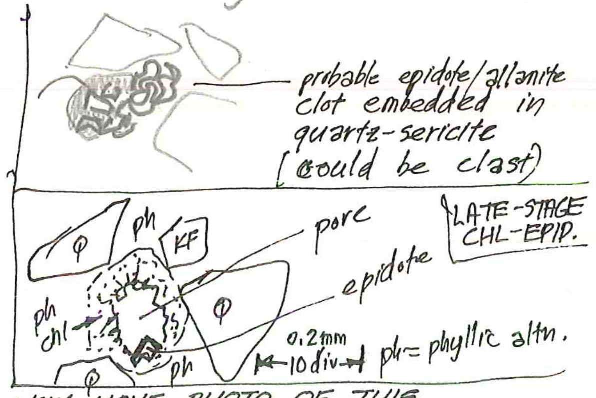


calcite clast surrounded by calcite cement

✻ – those marked with ink could be chert

sed is shale/arg.

cht – 12
29 felsic



NOW HAVE PHOTO OF THIS

FRAMEWORK SUMMARY

Q = 53.8%
F = 19.8%
RF = 26.4%

F/RF = 0.75

RF%
14.3% SiO2 crypxln.
2% shale
2% q-s schist
8.2% plutonic
2% calcite
71.5% felsic volc.

SAMPLE B17 3196-3216
NUMBER OF POINTS COUNTED 257
MAGNIFICATION 40X
DATE 04/30

27% matrix

JH

lw

✓ chl.

NO: SOME ARE CHERT

RECOUNT OF 100 ROCK FRAGMENTS
cht 卌 卌 卌 (15) =
~~卌~~ Volc 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 /// (88)

		FRAMEWORK GRAINS																	CEMENT														POROSITY		MISCELLANEOUS			
		MONOMINERALIC GRAINS (AND PERTHITE)									ROCK FRAGMENTS																											
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR orth san	mic	PLAGIOCL.	ν PERTHITE	DK OPAQUE			CHERT	SED.	MET.	PLUT.	fg VOLC.	mfm volc			silica QUARTZ	CALCITE	~~DOLOMITE~~ Leucox	~~SIDERITE~~ chl	~~GYPSUM~~ rutile ?	ANHYDRITE	FeOx	ER				CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				
	1	卌 卌 卌	卌	卌	/	卌 /	卌 卌	//							卌 卌	/			卌	卌	卌	///	/			/						see below						
	2	卌 卌 卌	/	卌											卌 卌				卌	卌	///																	
	3	卌 卌		卌											卌 卌				10	10	8	3	1			1												
	4	卌 卌		卌											卌 卌																							
	5	卌 卌		////											///																							
	6	卌 卌		////																																		
	7																																					
	8																																					
	9																																					
	10																																					
	11																																					
	12																																					
	13																																					
	14																																					
	15																																					
	16																																					
	17																																					
	18																																					
	19																																					
	20																																					
	21																																					
	22																																					
	23																																					
	24																																					
	25																																					
	26																																					
	27																																					
	28																																					
	29																																					
	30																																					
	31																																					
	32																																					
	33																																					
	34																																					
	35																																					
	36																																					
	37																																					
	38																																					
	39																																					
	40																																					
	41					(13,3%)	2,2,2%																															
	42																																					
		70	6	28	1	6	10	2							43	1																						

76 45 44 ⇐ 165

卌 卌
卌 卌
卌 /

NOTES, COMMENTS

Matrix "A": v. f. gr/xln intergrowth of quartz, minor illite & prob. some original dust-size matrix avg. grain or xl. size is about 2-3 mm (<1-5μ) — <10% illite fibers & flakes <5 (avg 2-3) μ length or diameter

<10% illite

卌 卌 卌 卌 卌 卌 卌 卌
卌 卌 卌 卌 卌 卌

(70)

MATRIX "B" — as above, except the diss. illite flakes coalesce to form clots up to 0.2 mm (avg < 0.05 mm) in dia (irreg.): also: individual crystals (illite) up to 10 microns diameter.

>30% illite

卌 卌 卌 卌 卌 卌 卌
卌 ////

(44)

from <0.01 –
AVG. GRAIN SIZE ~ 0.1 MM

MOSTLY ~~SUBRD~~ SUBANGULAR VARYING FROM ANGULAR TO SUBRNDED

SAMPLE B19-3120-3140
NUMBER OF POINTS COUNTED 300
MAGNIFICATION 200X
DATE JANUARY 2, 1985

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) / ROCK FRAGMENTS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE			CHERT (& other cryptoxln. silica)	SED.	MET.	PLUT.	VOLC.			
	1	//														
	2	//		/												
	3	卌														
	4	/											/			
1	5	/														
3	6	/		/					/							
4	7	/		//									/			
5	8	///		//												
4	9		/	//	/				/				//			
9	10	///		////									//			
8	11	////		///					/							
7	12	///		////												
12	13	卌 //		///	/								/			
8	14	卌 /		/					/							
9	15	卌	~~/~~	//					/				/			
10	16	卌 /	~~/~~	//									/			
4	17	///		/												
9	18	卌 //				/			//				/			
1	19	/														
4	20	///			/											
5	21	/			/								///			
3	22	//											/			
5	23	////		/												
4	24	///			/								/			
6	25	///	/	/									//			
4	26	///		/					/							
2	27	/											/			
5	28	//	/						/			/	/			
3	29	/	/	/												
1	30												/			
2	31	/											/			
4	32	//		/									/			
—	33															
1	34			/												
2	35	//														
1	36	/														
2	37	//														
—	38															
2	39	/	|						|							
1	40			/												
1	41	/														
—	42															
8		46-1 (0.37) 55-1 (0.46) 60-1 (0.50) 5		49-1 60-1 52	(11.6%)	(4.7%) 48-1 1			③ 14%			① 5%	⑰ 81 %			

1.5-1φ { 58-1 (0.49) 51-1 (0.43)

1φ (0.5mm)

(160) TL (89) ⑦ 76 (36) ⑤ 43 ② 21 (160) TL

4

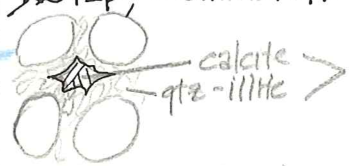
CEMENT: QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	Chl	sphene or epidote/allanite		CLAY RIMS & MATRIX ILLITE	ACCESSORY MINERALS	MATRIX: silt	clay size	POROSITY: PRIMARY	SECONDARY	MISCELLANEOUS			
2	10						5	5		20	⑰	18	49						

+ note change

+ 12 from ←

✓ dH

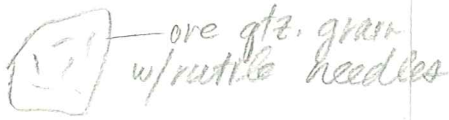
NOTES, COMMENTS (SEE ALSO REVERSE)



> calcite seems to post-date phyllic altn. (chlorite locally in equivalent spatial position)

259

269



FRAMEWORK SUMMARY

F/RF = 2.05
φ = 60%
F = 26.9%
RF = 13.1%

RF: %
14.3 cryp. silica
4.8 plutonic
80.9 felsic volc

SAMPLE BACA 20 3030-3050 (S3)
NUMBER OF POINTS COUNTED
MAGNIFICATION ~~40x~~ 100X
DATE: 05/03/85

JH

		FRAMEWORK GRAINS														
		MONOMINERALIC GRAINS (AND PERTHITE)							ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR m	PLAGIOCL.	v PERTHITE			CHERT	SED.	MET.	PLUT.	VOLC. rhy and			
	1															1
	2															2
	3	///		//												3
	4		/													4
	5	/														5
	6															6
	7		/	//												7
	8												/			8
	9	//														9
	10				/											10
	11	///														11
	12	/														12
	13															13
	14	/			/											14
	15	/														15
	16			/												16
	17	///							/				/			17
	18	/			/								//			18
	19	/														19
	20	/	/			/										20
	21	/														21
	22		/													22
	23	/														23
	24															24
	25		/													25
	26	/	/													26
	27	//														27
	28	/	/													28
	29	///														29
	30		//										/			30
	31															31
	32															32
	33								/							33
	34															34
	35															35
	36															36
	37		/													37
	38												/			38
	39															39
	40	//														40
	41															41
	42	//														42
		41-1 31	9	5								50-1	46-1 60-1 78-1			43

40

5

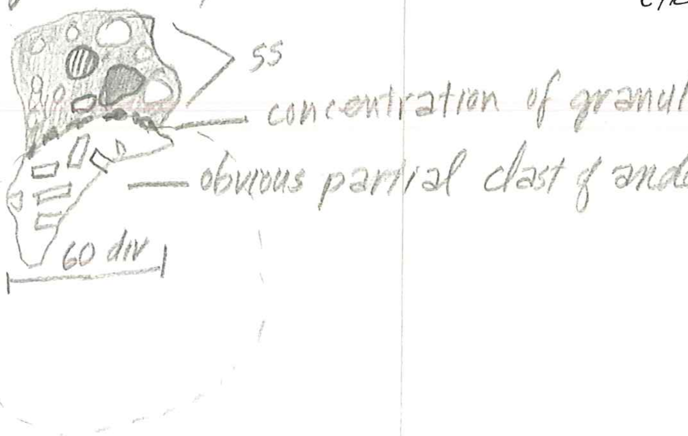
3

CEMENT														POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOX	chl			CLAY RIMS	ACCESSORY MINERALS	MATRIX clay size	silt size	PRIMARY	SECONDARY				
	/						/					𝍸𝍸𝍸𝍸𝍸𝍸 ////	/						

NOTES, COMMENTS

1 quartz(42) w/ rutile(?) needles

SHARDS IN MATRIX
(RELICT; ALTERED
CIRCLED ON THIN-SECTION)



concentration of granular sphene

obvious partial clast of andesite porphyry

SAMPLE B20 3050-3070'
NUMBER OF POINTS COUNTED
MAGNIFICATION 100X
DATE 05/10/85

22RD1 / RECOUNT OF 100 ROCK FRAGS
CHT ~~//// ////~~ (10) =
VOLC ~~//// //// //// //// //// //// //// //// //// ////~~ //// //// / (91)
MET ~~////~~ (5)

✓ cht

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) — ROCK FRAGMENTS

M A T R I X

	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR s/o	m	PLAGIOCL.	PERTHITE	CHERT	SED.	MET.	PLUT.	VOLC.	CEMENT: QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	QTZ-IL → MATRIX + SILT + CLAY	POROSITY: PRIMARY	SECONDARY	MISCELLANEOUS
7ϕ		1												/	////						///			///		
6ϕ COARSE SILT		2	//																							
9.0		3	/		//																					
6.4 5ϕ		4	///		/								//													
4.5ϕ	9	5	////		/								////													
9.2	8	6	//		///								/													
	5	7	////		/				/																	
4ϕ	7	8	/		/								//													
17.0	5	9	////																							
3.5ϕ	12	10	////		/		/		/				////													
	6	11	///		//		/																			
	5	12	/		/		//																			
28.4	8	13	//// /		//																					
0.084	13	14	//// //		//			/					///													
0.11	8	15	//// ///		/																					
0.125 3ϕ	7	16	//		/		/		/				///													
14.2	3	17	//					/																		
	4	18	///		/																					
	1	19	/																							
	3	20	/		/								/													
	2	21	/				/																			
2.5ϕ	6	22	////		/								/													
	6	23	/		//			/	/				/													
15.6	1	24									/ 9=5 sch.															
	1	25					/																			
	—	26																								
	3	27	///																							
	2	28	//																							
	2	29	//																							
2ϕ	2	30				/		/																		
	—	31																								
	2	32	/				/																			
	1	33	/																							
7.8	—	34																								
	2	35	/										/													
	—	36																								
	1	37	/																							
	1	38											/													
		39																								
	2	40	//																							
		41			62.8		22.8	14.4																		
1.5ϕ	2	42	/					/															+12 from (128)			
1.4			(79)		(21)	(1)	(8)	(5)	(4)		(1)		(26)	1	5						3		117			

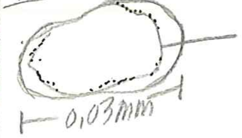
417L 1ϕ 2 (60–1 (0.50 mm)
.60=1ϕ

(35) (27) 51-1 (0.42mm) 141 TL 14 13

NOTES, COMMENTS

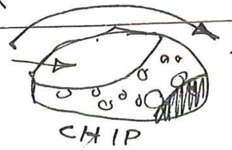
brown-yellow brn, transl.
definitely post-depositional epidote (≠ allanite) v. fxln. aggregates w/ind. xls. << 0.005 mm, aggregates < 0.02 mm (irregular, mostly between and partly replacing grains.

A few nice overgrowths on qtz. (SiO2 ✓ for inclusions.



dust, vacuole, ring > quartz grain of sedimentary origin
(OVERGROWTHS ARE ROUNDED)

- There are no broken larger clasts as might be expected in a coarser sandstone or conglomerate.



(267)

FRAMEWORK SUMMARY

ϕ - 56%
F - 24.8%
RF - 19.2%

F/RF = 1.3

RF's
3.7% met
96.3% felsic volc.

SAMPLE B22RD1 (S3 SAND) 3100-3120'
NUMBER OF POINTS COUNTED 271
MAGNIFICATION 100X (ESL)
DATE 04/26/85

JH

165
85
250

///// ///// /////
///// ///// /////
////

FRAMEWORK GRAINS

		MONOMINERALIC GRAINS (AND PERTHITE)						ROCK FRAGMENTS						
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR ORTH	POTASSIUM FELDSPAR µ CLINE	PLAGIOCL.	PERTHITE	CHERT	SED.	MET.	PLUT.	felsic VOLC.	Intm. VOLC.	shards
	1	///// /////		/////	/	/	///// /////					/////	///	
	2	///// ///// /		/////			////					/////		
	3	///// /////		/////								/////		
	4	///// /////		/////								/////		
	5	///// /////		/////								/////		
	6	///// //										/////		
	7											/////		
	8											/////		
	9											/////		
	10											/////		
	11											/////		
	12											/////		
	13											/////		
	14											/////		
	15											/////		
	16											/////		
	17											/////		
	18							10 chert				/////		
	19											/////		
	20											//		
	21													
	22					58								
	23													
	24													
	25													
	26													
	27													
	28													
	29													
	30													
	31													
	32													
	33													
	34													
	35													
	36													
	37													
	38													
	39													
	40													
	41													
	42						62.5%	2.7%	35%					
		58		25	1	1	14					[illegible]	3	3

0.29%

40

F/RF = 0.4

100

⇐ ~~1[illegible]~~ 201

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS
→ NO CEMENT ←															

NOTES, COMMENTS

MATRIX A (SEE B-19)

///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// ///// //

(72)

MATRIX B (SEE B-19)

///// ///// ///// ///// ///// ///// ///// /////

(40) 112

(112)
198
313

36% MATRIX

64% GRAINS

Frags from 5µ to at least 1.0 mm. larger ones tend to be intm. volc. rx

frags/clasts are sub rounded to ∡ (mostly ∡)

avg is ~~[illegible]~~ 0.05 mm dia.

Looks more like a breccia than a sandstone

some py is primmed w/ brick red hem.

overall: — wk-mod (locally strong) fibrous to flaky illite — as diss. individual flakes & fibers avg ~ 3-5µ, as clots of these up to 0.05 mm in dia. — as ~~[illegible]~~ as rims, partial to complete formed of these flakes & fibers & around grains as wispy discontinuous veinlets, commonly sub//, of these flakes & fibers up to 10µ wide (avg. ~ 5-3µ wide).

SAMPLE B24 3600-3620
NUMBER OF POINTS COUNTED ~~[illegible]~~ 310
MAGNIFICATION 200X
DATE 01/03/85

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) — ROCK FRAGMENTS

		NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	CHERT	~~SED.~~ plut	MET.	~~BASLT.~~ intm. volc	fels-VOLC.	shards
	0,02		1	////		//							/	
5 4.5	0,03 0,04		2	𝍸 ///		𝍸 //							//	
4.0	0,06		3	////		/							///	
3.5	0,08		4	𝍸 //		//							///	
	0,11		5	𝍸		/							𝍸 /	
3	0,125		6	/									/	
	0,145		7	///		///							/	/
2.5	0,168		8	///									////	
	0,189		9	//		///							////	
	0,21		10	/		/							///	
	0,231		11			/							///	
2	0,252		12	///									////	
	0,273		13			//							𝍸	/
	0,294		14	/									//	
	0,315		15	/									/	
	0,336		16	//									///	
1.5	0,357		17											
	0,378		18	/									///	
	0,398		19			/								
	0,42		20										/	
	0,44		21	/									/	
	0.46		22			/							/	
	0.48		23	/										
1.0	0,50		24											
	0,52		25										//	
	0,55		26										/	
	0,57		27										//	
	0,59		28											
	0,61		29			/				/			//	
	0,63		30										/	
	0,65		31											
	0,67		32										/	
	0,69		33											
0.5	0,71		34											
	0,73		35										/	
	0,76		36											
	0,78		37											
	0,80		38	/									/	
	0,82		39										/	
	0,84		40											
	0,86		41	/							|			
	0,88		42											

1.03 – I
1.62 – I

2.65-1

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS

NOTES, COMMENTS

albite veinlet

hydration cracks

	Φ	F	V	Shds	TL	%
~~5-6Φ~~	~~9~~	~~8~~	~~4~~		~~21~~	
4.5-5Φ	8	5	1		14	10.3
4-4.5Φ	4	1	4		9	6.6
3.5-4Φ	7	2	4		13	9.6
3-3.5Φ	6	1	7		14	10.3
2.5-3Φ	6	3	5	1	15	11.0
2-2.5Φ	6	5	11		22	16.2
1.5-2Φ	4	2	11	1	18	13.2
1-1.5Φ	3	2	6		11	8.1
0.5-1Φ		1	10		11	8.1
0-0.5Φ	2		4		6	4.4
(-)0.5-0Φ	1	2			2	1.5
(-)1-(-)0.5Φ	–	–	–			
(-)1.5-(-)1Φ			1		1	0.7
(-)2-(-)2.5Φ						
<2Φ						
					136	

SAMPLE B24 3600-3620' clasts
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE:

			FRAMEWORK GRAINS											
			MONOMINERALIC GRAINS (AND PERTHITE)					ROCK FRAGMENTS						
	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o m	PLAGIOCL.	PERTHITE	CHERT	SED.	MET.	PLUT.	int. VOLC.	fels. volc.	acc lap	plum
0.016	0	1													
5ϕ 0.032 (0.6) (1%)		2													
4.5ϕ 0.048 (2.4) (4%)	2	3	/		/	—									
4ϕ 0.064 (4.4) (7.6%)	8	4	卌 //										/		
0.080	15	5	卌 ////		//	//									
3.5ϕ		6	//										//		
0.096 (12.1%)	24	7	卌 卌 //		//	/							/		
0.112 (7)		8	///		/								///		
3ϕ 0.128		9	卌 //		/								//		
0.144 (17.2%)	34	10	卌 ///		///	///		/					///		
0.160 (16)		11	////		/	/									
2.5ϕ 0.176		12	卌 ////		////			/					///		
0.192		13	卌 ///			/									
0.208 (28.8%)	57	14	卌			//	/						//		
0.224 (16.7)		15	卌 ////		//			/				/	////		
0.240		16	///										///	/	
2ϕ 0.256		17	////		//	/							///		
0.272		18	//		/										
0.288	39	19	///		/		/						//		
0.304 (19.7%)		20	卌		卌								//		/
0.320 (11.4)		21			/								//		
0.336		22	//										/		
1.5ϕ 0.352		23	/				/								
0.368		24													
0.384		25											/		
0.400	14	26	//			/									
0.416 (7.1%)		27	/			/									
0.432		28													
0.448 (4.1)		29									/			/	
0.464		30	//										/		
0.480		31											/		
1ϕ 0.496		32	/												
0.512		33											/		
0.528		34													
0.544	4	35						/							
0.560 (2%)		36													
0.576 (1.2)		37	/												
0.592		38													
0.608		39													
0.624		40													
0.640		41													
0.656		42													
0.672	(195)		(110)		(27)	(14)	(3)	(4)			(1)	(1)	(36)	(3)	(1)

-0ϕ
0.5% (1)
-1 to -1.5ϕ

1-2.05 mm.

200

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	chl	ab					PRIMARY	SECONDARY				
卌 //							卌	卌 卌 /						卌 卌				

NOTES, COMMENTS

matrix

卌 卌

///

(123)

RF-42 21.4
F-44 22.5
q-110 56.1
196

2.2

GR-1
volc-41
otha-4

QTZ- 110
FSP- 45
RF - 46
201

ϕ-54.7
RF/FSP=1.02

5 other -10.9%
41 volc - 89.1%
~~9.2~~ 1" 2.7 int, 87.3 fel.v.

TLpts=

m-0
30 other
14 plag

SAMPLE VC-2B 1167' upper cont., 53
NUMBER OF POINTS COUNTED [illegible]
MAGNIFICATION
341
DATE 01/26/89

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE)

ROCK FRAGMENTS

CEMENT

	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)
(0) 0.016		1
5ϕ 0.032		2
4.5ϕ (1.5%) 0.048	4	3
4ϕ (3.1%) 0.064	8	4
(3.8) (5.8%) 0.080	15	5
3.5ϕ 0.096		6
(14.4%) 0.112	37	7
3ϕ (9.4) 0.128		8
(27.3% 0.144		9
~~(17.8)~~ 0.160	70	10
2.5ϕ 0.176		11
0.192		12
(22.2%) 0.208	57	13
~~(14.8)~~ 0.224		14
0.240		15
2ϕ 0.256		16
(7.9) 0.272		17
~~(12.1%)~~ 0.288	31	18
0.304		19
(1%) 0.320		20
0.336		21
1.5ϕ 0.352		22
0.368		23
0.384		24
0.400		25
(5.5%) 0.416	14	26
(3.6) 0.432		27
0.448		28
0.464		29
0.480		30
ϕ 0.496		31
0.512		32
0.528		33
0.544		34
(1.8) 0.560		35
(2.7%) 0.576		36
0.592	(7)	37
0.608		38
0.624		39
0.640		40
0.656		41
0.672		42

0.5ϕ

MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	CHERT	SED.	MET / pl.	int. volc ~~PLUT.~~	fels. VOLC.	arm	acc	shards	pum
(123)		(45)	(6)	(2)	(10)		(1)	(5)	(31)	(1)	(5)	(10)	// (17)

QUARTZ | CALCITE | DOLOMITE | SIDERITE | GYPSUM | ANHYDRITE | FeOx

CLAY RIMS | ACCESSORY MINERALS | MATRIX | POROSITY: PRIMARY, SECONDARY | MISCELLANEOUS

NOTES, COMMENTS

matrix

(0.71 – 1 mm –
0.5 – 0ϕ — (1) pum — 0.4% 0.3

0 to (–) 0.5ϕ
1.0 – 1.41 mm — (6) pum — 2.3% 1.5

–0.5 – –1ϕ
1.41 – 2 mm — (6) pum — 2.3% 1.5

–1 – –1.5ϕ
2 – 2.8 mm — (1) acc. lap. — 0.4% 0.3

257 TL

vol. – 69
other 11

Q – 123
F – 53
RF – 81

RF – 47
F – 53
Q – 123
223 – 55.2

391 pts

15
~~256~~ TL pts

+

(256)

SAMPLE VC-2A 1171.3'
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE

1 — 2.13 mm

1 – 1.48	1 – 0.70	1 – 1.42	1 – 1.43
1 – 1.82	1 – 1.13	1 – 1.03	1 – 0.97
1 – 1.33	1 – 1.3	1 – 0.74	1 – 1.53
1 – 1.11	1 – 1.82	1 – 1.13	

1 @ 10.5 mm
1 @ 7.3 m
1 @ 8.6 mm

66 18

FRAMEWORK GRAINS

		NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE): MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE			ROCK FRAGMENTS: CHERT	SED.	MET.	PLUT.	intr VOLC.	felsic vlc	shds / pum	acc lap / arm
	0.016		1															
5	0.032	X	2			/												
(1.1)	0.048	(1.1) (4)	3	//		//												
4 (2.0)	0.064	(3) (7)	4	//		/	/									///		
(6.2)	0.080	(9.4) (22)	5	/////		//////	//									////	/	
	0.096		6	//////		/												
(13.0)	0.112	(19.6) (46)	7	///////////////////		//	/				/					///////	///	
3	0.128		8	/////		//										///		
(14.9)	0.144	(22.6)	9	////////////////////		/										//	/	
	0.160	(53)	10	///////////		///	/									////	/	
	0.176		11	/////		/////												
	0.192		12	//////////////		///	/									///		
(14.7)	0.208		13	/////														
	0.224	(52)	14	////		///	/				//							
	0.240	(22.1)	15	///////////		//										/		
2	0.256		16	/												/		
	0.272		17	/		/												
	0.288		18	/		/											/	
	0.304	(22)	19	//							/					/	//	/
(6	0.320		20	/											/	//		
	0.336	(9.4)	21	/														
1.5	0.352		22	//		//	/											
	0.368		23	/		//												/
	0.384		24	/		/	/										/	/
	0.400		25															
	0.416		26	/	/													
	0.432	(17)	27			/												
(4.8)	0.448	(7.2)	28															/
	0.464		29	/														
	0.480		30	/														/
1	0.496		31															/
	0.512		32															
	0.528		33															
	0.544		34															/
	0.560		35															/
	0.576	(3)	36															
(0.9)	0.592	(1.3)	37															
	0.608		38															
	0.624		39															
	0.640		40															
	0.656		41															
	0.672		42														/	
				(123) (34.7)		(40)	(9)				(4)				(1)	(31)	(18)	(9

63

1-.86
1-1.95
1-0.72
1-3.18
1-2.165

1-1.29
1-1.55

1-2.25

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx					CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY: PRIMARY	SECONDARY	MISCELLANEOUS			
/																			

NOTES, COMMENTS

matrix

120

$$\left[\begin{matrix}1-0.71\,mm\\0-0.5\Phi\end{matrix}\right] = 2\ (0.9)\ (0.6)$$

$$\left[0-\overset{1.41}{(-)0.5}\right] = 1\ (0.4)\ (0.3)$$

$$\left[(-)0.5-\overset{(2.0)}{-1}\right] = 3\ (1.3)\ (0.9)$$

$$\left[-1-\overset{(2.83)}{-1.5}\right] = 2\ (0.9)\ (0.6)$$

$$\left[-1.5(-)-\overset{(4)}{-2}\right] = 1\ (0.4)\ (0.3) \longleftrightarrow 235\ T$$

(355)

32 RF
49 FSP
1 Mev

(235)

SAMPLE 1174 VC-2A
NUMBER OF POINTS COUNTED 355
MAGNIFICATION 01/30/89
DATE 100X

FRAMEWORK GRAINS

ϕ	mm	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLYXLN. QUARTZ	POTASSIUM FELDSPAR m	PLAGIOCL.	PERTHITE			CHERT	nondesc. ~~SED.~~ rnd lath	MET.	PLUT.	fels VOLC.	intm volc.	sh / pum	acc lap
	0.016	(6)	1															
5ϕ	0.032		2															
	0.048	(1)	3			/												
4.5ϕ	0.064	(8)	4	/////		///									/			
4ϕ	0.080	(14)	5	////		/					/				///			
3.5ϕ	0.096		6	///		/////									/			
	0.112	(40)	7	///// ///// /////		///// ///// //					//	/			///		/	
	0.128		8	////			/ 1					//						
3ϕ	0.144		9	///// ///// ///// ///		///	/ 11				///	plag /			///// /		//	/
	0.160	(56)	10	///// ///		//	/ 1								////			
	0.176		11	//		/	1					/			/			
2.5ϕ	0.192		12	///// ///// /		//					/	/	/		/		/	/
	0.208		13	///							/				//			
	0.224	(42)	14	///		////					/	/			/			//
	0.240		15	/		/	/								/			
	0.256		16	//														
2ϕ	0.272		17	///												/	/	/
	0.288		18	////														
	0.304	(18)	19	//		/									/		/	
	0.320		20												/		/	
	0.336		21	/											/			
	0.352		22															
1.5ϕ	0.368		23															
	0.384		24	/														
	0.400		25															
	0.416	(4)	26															
	0.432		27	/														
	0.448		28															
	0.464		29												/			
	0.480		30															/
1ϕ	0.496		31															
	0.512		32															
	0.528		33															
	0.544		34															
	0.560	(0)	35															
	0.576		36															
	0.592		37															
	0.608		38															
	0.624		39															
	0.640		40															
	0.656		41															
	0.672		42															
		(184)		~~(88)~~ (91)		(46)					(9)		(1)		(28)	(1)	7	6

(0.53) (0.3)
(4.42) (2.2)
(7.62) (3.8)
(21.7%) (10.8)
(30.48) (15.1)
(22.82) (11.3)
(4.8)
(9)
(2.2%) (1.1)
0

.5ϕ = 0.7
~~0.7~~
0.5-0ϕ = (1) (0.5%) (0.3)

1-0.97

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	Chl			CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS			
//	/						/											

NOTES, COMMENTS

matrix - /////

(2)

53%)

RF - 39 22.2
F - 46 26.1
Q - 91 51.7
176

SAMPLE VC-2A 1180.2'
NUMBER OF POINTS COUNTED 384
MAGNIFICATION 100X
DATE 01/28/89

					FRAMEWORK GRAINS													CEMENT										POROSITY		MISCELLANEOUS
					MONOMINERALIC GRAINS (AND PERTHITE)					ROCK FRAGMENTS																				
			NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	CHERT	SED.	MET. flot	int. ~~PLUT.~~	fels VOLC.	pum	shards	acc ar	QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY	
		0.016		1																									/////	
5φ		0.032		2																									//	
4.5φ	1.4	0.048	(3)	3			/			/				/																
4φ	2.3	0.064	(5)	4	//									///																
	7.3	0.080	(16)	5	/////		//////			/				/																
3.5φ		0.096		6	///		//							//																
	13.3	0.112	(29)	7	////		//	//						/////																
3φ		0.128		8	///////			/		/				//		/														
		0.144		9	///////		///							//		///	/													
	22.5	0.160	(49)	10	////////////		///////			/				////////																
2.5φ		0.176		11	/		///							/																
		0.192		12	/////////		/	//						//		/														
		0.208		13	//		//	//		/						/														
	24.3	0.224	(53)	14	///		//	/		/		/		//		//														
		0.240		15	/////		////							//////																
2φ		0.256		16	///																									
		0.272		17	//////		//							/		/														
		0.288		18	////					/		/		///																
	15	0.304	(33)	19	///////																									
		0.320		20	/		/							/			/													
		0.336		21													/													
1.5φ		0.352		22						/				/																
		0.368		23	///									/		/														
		0.384		24			/							/																
		0.400		25	///									/																
	9.6	0.416	(21)	26												/														
		0.432		27	///																									
		0.448		28			/																							
		0.464		29	//									/																
		0.480		30																										
1φ		0.496		31	//																									
		0.512		32													/													
		0.528		33																										
		0.544		34										/			/													
		0.560		35																										
	3.7	0.576	(8)	36	//											/														
		0.592		37																										
		0.608		38																										
		0.624		39										/																
		0.640		40																										
		0.656		41																										
		0.672		42													0.7-1													
					(97)		(38)	(8)		(8)		(2)		(47)		(12)	(6)													

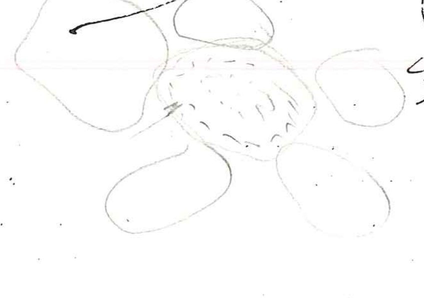
1-1.63

NOTES, COMMENTS

Matrix

(150)

0-(-)0.5φ - 1 — 0.5
0.5-0 — 0



(218)
150
368

1.67

~~cht 8~~
other-10

other 8
plut 2
volc 47
57

RF-57
F-46
Q-97
200

SAMPLE 1183.2'
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE:

73
46
27

.27

sub[illegible] – 𝍸
sub[illegible] – //

43 71 [illegible]

subrnd – 𝍸 /
rnd – 1

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) / ROCK FRAGMENTS

		NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	CHERT uxln sil.	~~SED.~~ nondescript qtz – SER	~~MET~~ plut ← met PLUT	~~PLUT.~~ int volc	felsic VOLC.	acc, lap. arm lap	shds	pum.
	0,016		1													
1(0,3)	0,032 5φ		2										/			
1(0,3)	0.048 4.5φ	0,5%	3										/			
4(1,1)	0.064 4φ	1.9%	4	///											/	
17 (4,8)	0,080 3.5φ	8.2%	5	𝍸 ////		///	/						/		//	
	0,096		6										/			
28 (7,9)	0,112	13.5%	7	𝍸		////			/				////		/	/
	0,128 3φ		8	𝍸	//	/			/				/		//	
	0,144	20.2%	9	𝍸 ///		/				//		/	/			
42 (11,8)	0.160		10	𝍸 ///		//			//	///			𝍸 /		//	
	0.176 2.5φ		11	//		//			/				/			
	0.192		12	𝍸 𝍸 /		/	///		/	//			////		/	
60 (16,9)	0,208	28.9%	13	𝍸		/			/							
	0,224		14	𝍸 ///		///				/			𝍸			
	0,246		15	𝍸 /		/	/				/		//			
2φ	0,256		16	/									/			
	0,272		17	///		//			/							/
	0,288		18	/		/								/		
	04	13%	19	/							/		/			
	20		20	//		//									/	
(7[illegible])	0,336		21	//									/		/	
1.5φ	0,352		22	////					/			/				
	0,368		23	//									/		//	
	0,384		24	//									//			
	0,400		25												/	
18	0.416	8.7%	26										/			
(5.1)	0.432		27	//												
	0.448		28													
	0.464		29			/							/			
	0.480		30									/	/	/		
1φ	0.496		31													
	0.512		32													
	0.528		33													
	0,544		34													
	0,560		35								/					
7	0.576	3.4%	36												/	
(1,9)	0.592		37													
	0,608		38													
	0.624		39										/		/	
	.640		40	/										/		
	0.656		41													
	0.672		42													/
				~~4~~ 91	2	25	5		9	8	2 2	2	38	~~4~~ 2	14	5

93

30

0.5φ = 0.71 mm

0.5–0φ = 2 → 1% (0,3)
0– –0.5φ = 2 ← 1% (0,3)

1-1.53 1-0.86 1-1.1 mm
1-0.8 mm

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	chl	CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS
/							𝍸 𝍸 𝍸					𝍸	

NOTES COMMENTS

matrix – 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸
𝍸 𝍸 𝍸

0,6%

40.2 39% — matrix 140
24.6 32.3 — RF's 86
8.6 8.4 – Fsp 30
26.6 20.3% qtz 93 209

RF/F = [illegible]
QTZ = 38.6%
349 26.6 qtz

~~shds – 3.9%~~
~~pum – 1.4%~~
~~arm/accs – 1.7%~~
~~FVRF – 10.6%~~
~~IVRF – 0.6%~~
~~plut – 0.6%~~
~~met – 0.6~~
~~cht – 2.5~~
~~unkn –~~

VRF → ~~[illegible]~~ 63 0.733
GR → ~~2~~ 2 0.023
other → 21 .244
86

16

(~~125 mat~~)
140 matrix

20[illegible]

RF – ~~86~~ 41.1%
FSP – 30 14.4%
QTZ 93 44.5
209
0.0
213

61 33.2
30 16.3
93 50.5
184 104

SAMPLE VC-2A 1186.7'
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE:

355

FRAMEWORK GRAINS																	
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm Volc.		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		151		28 31						25		2		31	2		

151

32

60

CEMENT																				
														POROSITY		MISCELLANEOUS				
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx					CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY					

NOTES, COMMENTS

matrix

131

M – 131 35 %
RF – 60 16 %
F – 32 8.6 %
Ø – 151 40.4 %
374

SAMPLE VC-2B 1201.45
NUMBER OF POINTS COUNTED
MAGNIFICATION
DATE:

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
		MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels. VOLC.	intm. volc.		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		(159)		33 2	5					(14)		(1)	(1)	(30)	(2)		

(40) (48)

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx		FL		CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
													PRIMARY	SECONDARY				
/								/										

NOTES, COMMENTS

Matrix

(129)

		1 2
matrix	129	34.1
qtz –	159	42.1
fsp –	40	10.6
rf –	48	12.7
cmt –	2	0.5
	378	100.0

1'

~~15~~ other	31.3
1 plut	2.1
32 volc	66.6

VC-2B

SAMPLE 1205.9' (367.5 m)

NUMBER OF POINTS COUNTED

MAGNIFICATION 100X

DATE: 02/09/89

subrnd – ///// ///// ///// ///// ///// / (÷2)
rnded –
sub-a – ///// ///// ///// ///// ///// //
ang. – ///// ///// ///// ///// //

FRAMEWORK GRAINS

	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE)									ROCK FRAGMENTS							
			MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o	m	PLAGIOCL.	PERTHITE mp				non descrip ~~CHERT~~ qtz-illite-chl	SED.	MET.	PLUT.	fels VOLC.	intm volc.	"salt & pepper" chert	xln SiO2
0.016		1	/	/															
5φ 0.032		2	//	/	/														
4.5φ 0.048		3	//		/											/		/	
4φ 0.064		4	//	/												/			
0.080		5	///////													//			/
3.5φ 0.096		6	////////	//	/														//
0.112		7	/////	//	/											///		//	/
3φ 0.128		8	//////////////									/				/			
0.144		9	/////////////													/	/		/
0.160		10	//////////////	/	//							/				//			/
2.5φ 0.176		11	/////////////	/	///							/				///			/
0.192		12	//////////	///	/														
0.208		13	/////////////	/				/						/		//			
0.224		14	///////		/														
0.240		15	////	/	/											///			
2φ 0.256		16	////													//			
0.272		17	/////													/			
0.288		18	////	//												/			
0.304		19	////													///			
0.320		20	/////			/		/								//			/
0.336		21	//////		////	/	/									/			
1.5φ 0.352		22	//													/			
0.368		23	///	/														/	
0.384		24	/	/												//		/	
0.400		25	/////		/														
0.416		26	//																
0.432		27	//																
0.448		28	//////													/			
0.464		29	/																
0.480		30	////	/	/														
1φ 0.496		31	/																
0.512		32	/																
0.528		33	/													/			
0.544		34	/																
0.560		35	//	/												/			
0.576		36																	
0.592		37																	
0.608		38	/		/														
0.624		39																	
0.640		40																	
0.656		41																	
0.672		42																	
↓ 0.5φ (0.71 mm)			158 179	21	17 24	2	1	2				(3)		1		37	1	5 (13)	8

(55)

CEMENT

SIZE	QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS			
1	////	///																	
2	///																		
5	5																		
10	10																		
15	15																		

Chal

NOTES, COMMENTS

20

matrix – ///// /// } 118

MATRIX	118	— 31.4%
FRAMEWORK GRAINS	2~~5~~8	— 68.6%
CEMENT	13	

mat. 118
qtz. 179
fsp. 24
rf

fels	int	cht
37	1	13
72.5	2%	25.5

51

~~one~~ 3 qtz frags rimmed w/ hem (Abo? Yeso?)

13 chert
38 volc
no pert

RF – cht. 13 VRF – 41 or

SAMPLE VC-2B 1210′
NUMBER OF POINTS COUNTED (376)
MAGNIFICATION ______
DATE 11/17/88

FRAMEWORK GRAINS																
		MONOMINERALIC GRAINS (AND PERTHITE)							ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR 0	PLAGIOCL.	PERTHITE			CHERT	SED.	MET.	PLUT.	fels VOLC.	intm		
	1															
	2															
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															
	16															
	17															
	18															
	19															
	20															
	21															
	22															
	23															
	24															
	25															
	26															
	27															
	28															
	29															
	30															
	31															
	32															
	33															
	34															
	35															
	36															
	37															
	38															
	39															
	40															
	41															
	42															
		(150) 40.2%		(25)	(2)				(37)				(17)	(2)		

CEMENT												POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY			

NOTES, COMMENTS

Matrix

(140)

(373)

hyd. sphere
N aggregates
line some
pores

1
150 Q
27 F
54 RF
231

SAMPLE VC-2B 1214.7′ (370.2 m)
NUMBER OF POINTS COUNTED
MAGNIFICATION 100X
DATE: 02/08/89

FRAMEWORK GRAINS																	
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR 6 m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm. volc.	shd	mkn
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		150		39 2	2					27	1		2	32	7	2	

43

69

2

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx		FL					PRIMARY	SECONDARY				
/								/										

NOTES, COMMENTS

Matrix

127

Gr-2 .03
oth-28 .419
v-39 .56

SAMPLE VC-2B 1220' (371.8M)
NUMBER OF POINTS COUNTED 391
MAGNIFICATION
DATE:

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
		MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm volc		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		(107)	(17)	(1)	(31)	(1)				(14)	(3)	(2)	(12)	(18)	(12)		

(50)

(61)

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	lex		py				PRIMARY	SECONDARY				
	//						/		/									

(61)

NOTES, COMMENTS

matrix

VC-2B
2502'
SFe

RF/F =

SAMPLE ______
NUMBER OF POINTS COUNTED ______
MAGNIFICATION ______
DATE: ______

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
		MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm. volc.		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		145	5	30	15					10		2	5	18	2		

150

45

37

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	leuc						PRIMARY	SECONDARY				
							//											

NOTES, COMMENTS

matrix

VC-2

Framework
Q - 150
F - 45
RF - 37
232

2.21

RF's
volc - 20 → 54.1
plut - 5 → 13.5
other 12 32.4

SAMPLE VC-2B 2439.2
NUMBER OF POINTS COUNTED
MAGNIFICATION 100x
DATE 1/17/89

"cochiti Fm equiv."

FRAMEWORK GRAINS																	
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR 0 m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fel. VOLC.	intm vlc		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		132		28 3	33					17		3	14	13	22		

1

64.

CEMENT													POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	leuc			CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				
//							///											

NOTES, COMMENTS

matrix

Framework

Q - 132	49.8 %	
F - 64	24.2	
RF - 69	26.0	
265		

RF's

volc. - 35	50.7 %	
gr. - 14	20.3 %	
other - 20	29.0 %	
69		

VC-2B

SAMPLE 2605' (Santa Fe)

NUMBER OF POINTS COUNTED ______

MAGNIFICATION ______

DATE: ______

X27

mm φ
(0)
(0.031) (1) 5φ
4.5φ
0.0625 (2) 4φ
3.5φ
(5)
0.125 3φ
(10)
2.5φ
(67)
(0.25) 2φ
(122)
1.5φ
(81)
(0.50) 1φ
(4)
0.5φ
(0.7mm)

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) — ROCK FRAGMENTS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o	POTASSIUM FELDSPAR m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm vol.	"salt & pepper" chert	chak.
	1																	
	2																	
	3																	
	4	/													/			
	5	/														/		
	6	/																
	7		/															
	8	/		/													/	
	9																/	
	10	/											/					
	11	//				//								/	/		/	
	12	/////		/		/									/		/	
	13	////	/	////		/							/					
	14	////	///												//		///	
	15	/////	/	///		//								/	//	/		
	16	/////////	/	/		///	/								//	/		
	17	////////	//	/////	/	/	/							/	////////		//	
	18	///////		///	/	///									//	////	/	
	19	///////////////	/			///	//								//		//	
	20	//////////		//	/	///								//	//		/	
	21	///				///								/	/			
	22	///////			/	//	/								////	/	/	
	23	//////////		///										/	///	/	/	
	24	////////		/										//	///	/	/	
	25	//////												//	//		/	
	26	///	//				/							/	/		/	
	27	////	/			//	/								//		//	
	28	/		/														
	29	//	/											/				
	30	///												/	//			
	31														/			
	32	/			/												/	
	33																	
	34																	
	35																	
	36		/															
	37																	
	38																	
	39																	
	40																	
	41																	
	42																	
		125 (140)	15	25	5	26 (63)	7						2	14	42	10	21	

203 — 292 — 89

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	Chl			CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS
///	//						/								
10															
15															
3	3						1								

49.7

NOTES, COMMENTS

matrix
20 ////////////////////
////////////////////
25 ////////////////////
////////////////////
//////////////////// } 100
30

Fr' G's			%
Quartz —	~~143~~ 140	—	47.9
FSP —	63	—	21.6
RF's	89	—	30.5
	292		

F/RF = 0.71

RF's

			%
plut	— 14	—	15.7
volc	— 52		58.5
other	— 23	—	25.8
	89		

cht & volc. r f's.

42	fels.	57.5
10	intm.	13.7
21	cht.	28.7
73		

upper Santa Fe sandstone

OVERALL - QTZ =

plut - 14
other - 75

SAMPLE VC-2B 2467.5'
NUMBER OF POINTS COUNTED 399
MAGNIFICATION 100X
DATE 11/22/88

		FRAMEWORK GRAINS															
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR KF	M	PLAGIOCL.	PERTHITE			CHERT	SED. pAbo	MET	PLUT.	Fels- VOLC.	intm volc	clst	
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		144	14	31	1	4					2	1	3	42	5	4	

158 32 4 57

CEMENT												POROSITY		MISCELLANE
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	Ep	(KF) Ad.		CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY
				(52)										
28	4						6	14				(49)		

NOTES, COMMENTS

ROCK FRAGMENT SUMMARY

VOLC – 47	(81%)		VOLC	(81%)
GR+ MIC: 4	(6.9%)		GR only (3)	(5.3%)
OTHER → 7	(12.1%)		OTHER	(13.7%)
58			57	

FSP. SUMMARY

KSP – 32 (88.9%)
PLAG – 4 (11.1%)

FRAMEWORK SUMMARY

QTZ → 158			(63.0%)
KF → 32	36	~~(14%)~~	(14.3%)
PLAG → 4			
RF →	57		(22.7%)
251			

$RF/F = 1.58$

fels – 42 82.4
int – 5 9.8
clst – 4 7.8
51

MORE INFO ON BACK

3 plut
54 other

SAMPLE SANTA FE SS (B-8) 3100-320
NUMBER OF POINTS COUNTED
MAGNIFICATION 200X
DATE NOV. 9, 1987

FRAMEWORK GRAINS																	
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR m	PLAGIOCL.	PERTHITE				~~CHERT~~ hbl	SED. SS	~~MET.~~	PLUT.	Fel. VOLC.	Int. volc.	sxln. silica/chert	g_s
	1	卌 卌	卌	卌 ||	卌 卌	|||				/	/		卌	卌	卌	卌	/
	2	卌 卌	|	卌	卌 卌								卌	卌	卌	卌	
	3	卌 卌		卌	卌 卌								/	卌	卌	卌	
	4	卌 卌		卌	卌 |									卌	///		
	5	卌 卌		卌										卌			
	6	卌 卌		卌		|								卌			
	7	卌 卌		卌										卌			
	8	卌 卌		卌										卌			
	9	卌 卌		卌										卌			
	10	卌 卌		卌										卌			
	11	卌 卌		|										卌			
	12	卌 卌												卌			
	13	卌 卌												///			
	14	卌 卌															
	15	卌 卌															
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		150	6	51 2	36	3				1	1	-	11	63	18	15	1
		156		53	36	3				110							

	CEMENT												POROSITY		MISCELLANEOUS			
SIZE (MICROMETER DIVISIONS)	QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx			CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				
1												///	/					
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		

NOTES, COMMENTS

Tr. detrital epidote

RF SUMMARY

VOLC — 81 (73.6%)
PLUT — 11 (10%)
OTHER — 18 (16.4%)
110

FSP SUMMARY

KF — 53 (57.6%)
PLAG — 36 (39.1%)
PERTHITE — 3 (3.3%)
92

cht fels int
15 63 18 = 96
15.6 65.6 18.8

FRAMEWORK SUMMARY

Q — 156
F — 92
RF — 110
358
→ 43.6% QUARTZ

RF/F = ~~0.8~~ ~~1.46~~ 1.20

✦ NOTE: COUNTED ONLY GRAINS — ROCK ONLY LOOSELY CONSOL. BADLY PLUCKED AS THIN-SECTION WAS MADE.

MAPPED BY SMITH ET AL, AS "ABIQUIU TUFF"

SAMPLE "SANTA FE" SAND near Ferron Hill
NUMBER OF POINTS COUNTED ~~358~~ 361
358
MAGNIFICATION 200X
DATE 11/9/87

FRAMEWORK GRAINS

	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o	m	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels VOLC.	intm volc.		
		1																	
5φ		2																	
4.5φ		3																	
4φ		4																	
		5																	
3.5φ		6																	
		7																	
3φ		8																	
		9																	
		10																	
2.5φ		11																	
		12																	
		13																	
		14																	
		15																	
		16																	
		17																	
		18																	
		19																	
		20																	
		21																	
		22																	
		23																	
		24																	
		25																	
		26																	
		27																	
		28																	
		29																	
		30																	
		31																	
		32																	
		33																	
		34																	
		35																	
		36																	
		37																	
		38																	
		39																	
		40																	
		41																	
		42																	
			128		28	1	24					23	1	4	10	30	12		

53

80

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS			

NOTES, COMMENTS

matrix

Framework
Q – 128 — 49%
F – 53 20.3%
RF – 80 30.7%
261

RF's
GR — 10 — 12.5%
volc – 42 52.5%
other – 28 — 35.0%

SANTA FE

SAMPLE VC-28 2541'
NUMBER OF POINTS COUNTED
MAGNIFICATION 100X
DATE 01/17/89

FRAMEWORK GRAINS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOMINERALIC GRAINS (AND PERTHITE): MONOXLN. QUARTZ	POLYXLN. QUARTZ	POTASSIUM FELDSPAR M	PLAGIOCL.	(not µ) PERTHITE	crs. mica			ROCK FRAGMENTS: CHERT	cal SED.	MET.	PLUT.	VOLC.			
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42			86.4%	12.1%	1.5%											
		92		51 6	8	1,	13			1	2	2	39	18	(62TL)		

92 Q

41.8% QTL

66 F

5 (.08)

5 (.07)

0.63

45 (0.66) 18

(0.29)

(0.27)

62RF

220TL

CEMENT

QUARTZ	CALCITE	DOLOMITE	Hem ~~SIDERITE~~	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY: PRIMARY	SECONDARY	MISCELLANEOUS			
			53															

NOTES, COMMENTS

matrix "A"

Matrix "B"

239

41

SS	slts	sh, mdst

arg
silty
[illegible]
ls

CRS. M – 13 (17.3%)
GR/RF – 39 (52.0)
~~VRF~~
OTH. RF – 23 (30.7)
75

58 grn + vcl + mica 72%
5 other 6%
18 volc 22%

SAMPLE B12 7600-7650
NUMBER OF POINTS COUNTED 300
MAGNIFICATION
DATE 02/05/86

ABO

80

		FRAMEWORK GRAINS															
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR M	PLAGIOCL.	PERTHITE	→			CHERT	SED.	MET.	PLUT.	VOLC.	b/c		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38													18		13		
	39																	
	40																	
	41			(59.5%)	(35.7%)	(4.8%)								~~18~~		13		
	42																	
		80	14	37 13	30	4	~~X~~					1	13	4	13		

94

~~45~~ 50   30   4

84

18

Pl.+mic = 31

CEMENT													POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx				CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				

NOTES, COMMENTS

ABO FM SANDSTONE- $CO_3^=$-RICH

120

bte - 13 41.2%
CRF - 13 41.2%
ORF 5 17.6%
31

RF'S.

VOLC 4 → 22.2%
PLUT. 13 → 72.2%
OTH. 1 → 5.6%
18

FRAMEWORK GRAIN SUMMARY

$\frac{RF}{F}$ = 0.21 $F/_{RF}$ = 4.67

Q = ~~48%~~ 48.0%
F = 42.9%
RF = 9.1%

~~RF SUMMARY:~~
~~MET = 6%~~ → 2.8%
~~VOLC = 22%~~ → 11.1%
~~PLUT = 72%~~ ~~PLUT + MIC. = 86.1%~~
120

SAMPLE 86-41 NM 86-4A
NUMBER OF POINTS COUNTED
MAGNIFICATION 100X
DATE: 11/05/86

FRAMEWORK GRAINS

MONOMINERALIC GRAINS (AND PERTHITE) · ROCK FRAGMENTS

NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE			mica	CHERT	SED. CO_3	MET.	PLUT.	fels.-volc.	Chrt		
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																
	17																
	18																
	19																
	20																
	21																
	22																
	23																
	24																
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																
	41																
	42																
		87	2	22	7						6	1	8	15	18		
		89		~~22~~ 29					1		48						

CEMENT

QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	EP				CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY PRIMARY	POROSITY SECONDARY	MISCELLANEOUS			
3	60					1							66						

NOTES, COMMENTS

FRAMEWORK SUMMARY

Q - 89	(53.6)	
F - 29	(17.5)	
RF - 48	(28.9)	
166	(100 %)	

RF/F = 1.66

18 chrt

FSP SUMMARY

KF - 22	(75.9%)
PL - 7	(24.1%)
29	

RF SUMMARY

PLUT - 8	— 16.7%
VOLC - 15	— 31.3%
SED - 25	52.0%
48	

mica - 1 - 2
GRF - 8 - 16.3
ORF - 40 - ~~86.7~~ 81.7
49

SAMPLE ABO-B13 8100-8150
NUMBER OF POINTS COUNTED ______
MAGNIFICATION 200X
DATE 11/10/87

FRAMEWORK GRAINS

		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS						
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	VOLC.		
	1															
	2															
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															
	16															
	17															
	18															
	19															
	20															
	21															
	22															
	23															
	24															
	25															
	26															
	27															
	28															
	29															
	30															
	31															
	32															
	33															
	34															
	35															
	36															
	37															
	38															
	39															
	40															
	41															
	42															
										22	2	3	9	6		
		107		16	18					42						

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOX	chl/	euc					PRIMARY	SECONDARY	chl			

NOTES, COMMENTS

Matrix

moving through SF

ϕ -107
F -32
RF 42

F/RF

SAMPLE VC-2B 2660' (Yeso)
NUMBER OF POINTS COUNTED
MAGNIFICATION 100X
DATE: 01/18/89

57

15

FRAMEWORK GRAINS																
		MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS						
NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR o M	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	VOLC.		
	1															
	2															
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															
	16															
	17															
	18															
	19															
	20															
	21															
	22															
	23															
	24															
	25															
	26															
	27															
	28															
	29															
	30															
	31															
	32															
	33															
	34															
	35															
	36															
	37															
	38															
	39															
	40															
	41															
	42															
		117		38 13	24	2				1			18	1		
		117			77								20			

CEMENT														POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx					CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY				

NOTES, COMMENTS

117 Qtz
77 F
20 RF

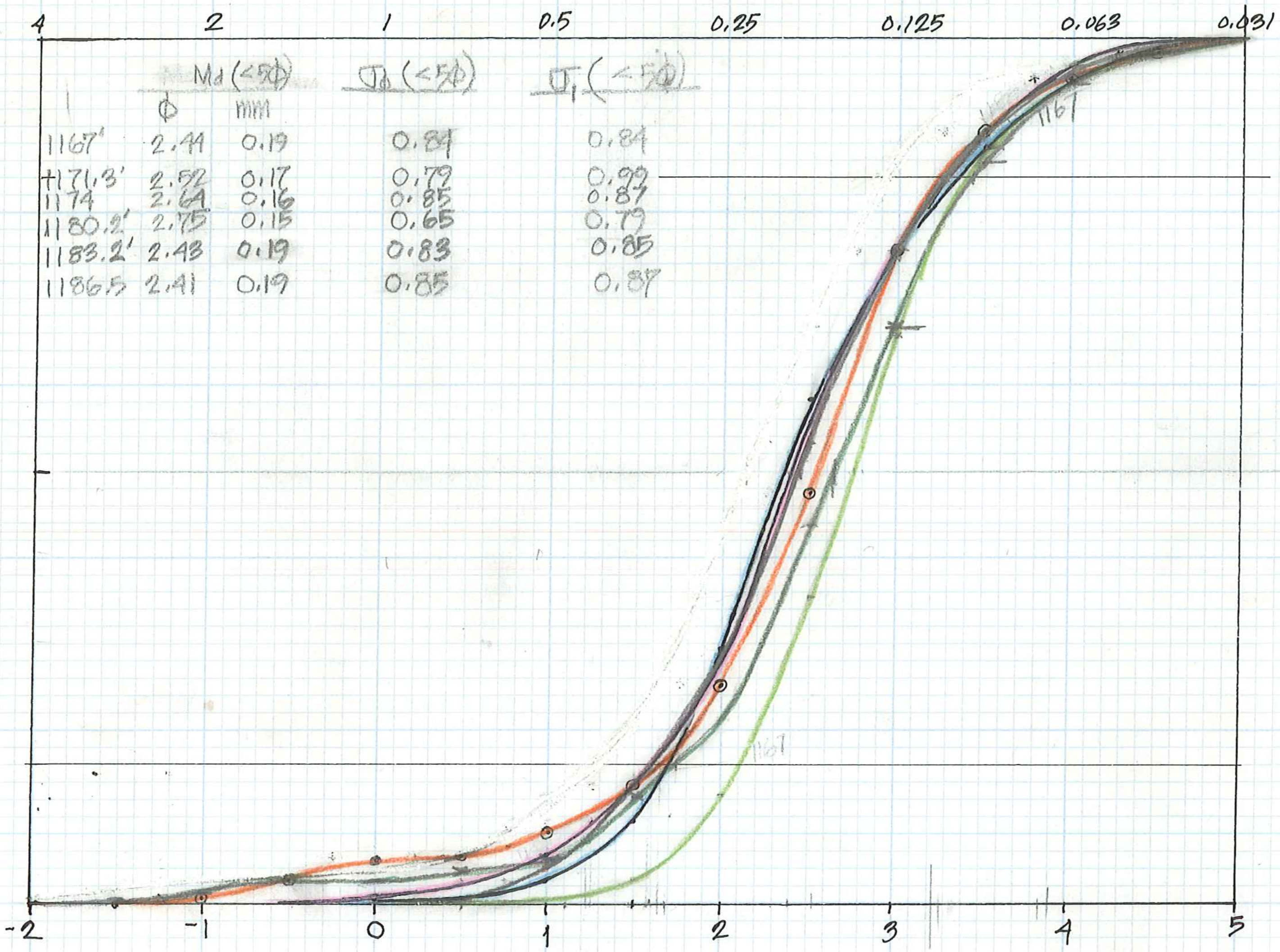
214

54.7

F/RF = 3,85

SAMPLE
NUMBER OF
MAGNIFICATI
DATE:

VC-2A S3, CLASTS ONLY



		Md (<5Φ)		σ_ϕ (<5Φ)	σ_I (<5Φ)
		Φ	mm		
Top	1167'	2.44	0.19	0.84	0.84
	1171.3'	2.52	0.17	0.79	0.99
	1174	2.64	0.16	0.85	0.87
	1180.2'	2.75	0.15	0.65	0.79
	1183.2'	2.43	0.19	0.83	0.85
btm	1186.5	2.41	0.19	0.85	0.87

0.143

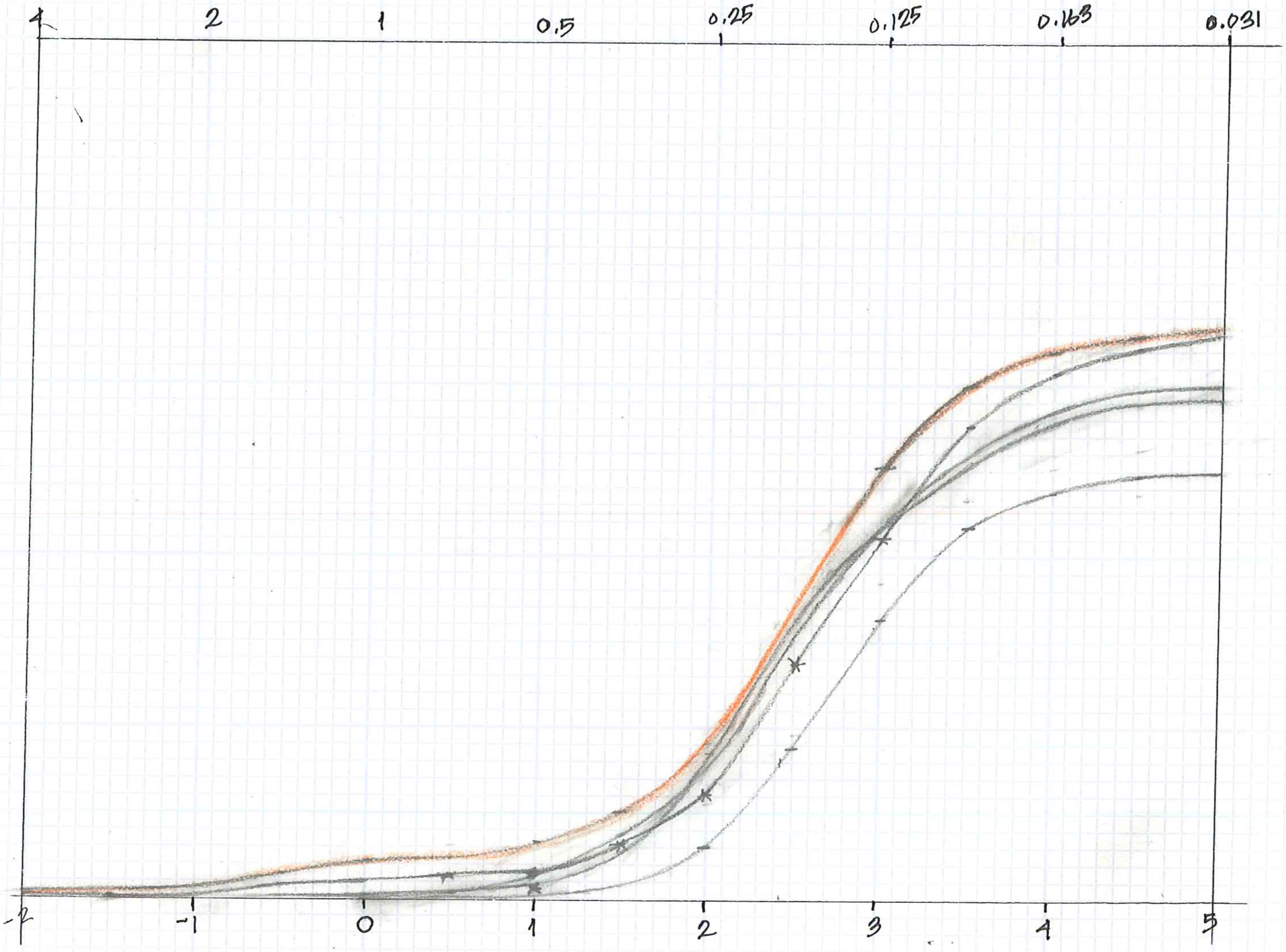
118

3.95
1.1
4

17

260 392

VC-2A S_3 , WHOLE ROCK



3.5 -

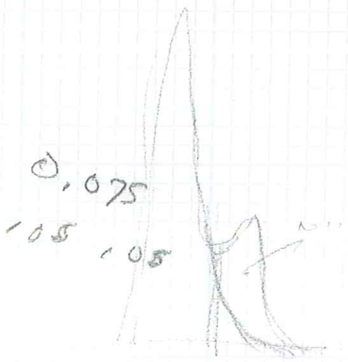
- 3 - 3.5ϕ = 1

- 2.5 - 3ϕ = 2

- 2 + - 2.5 - 0

8 = -3ϕ

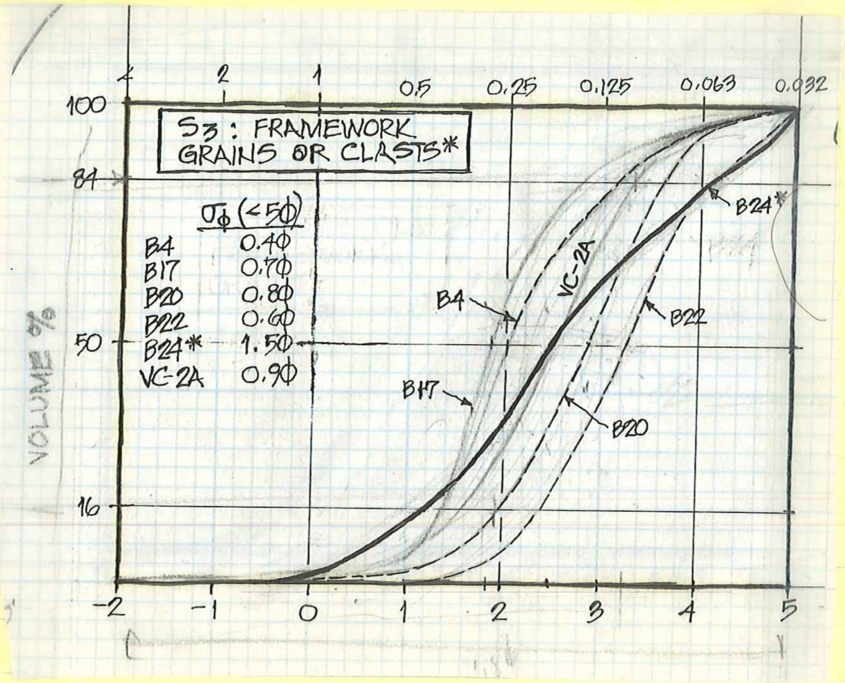
16 = -4ϕ



- 2ϕ = 4 mm

- 3ϕ = 8 mm

5

S3 : FRAMEWORK GRAINS OR CLASTS*
σφ (<5φ)
B4 0.4φ
B17 0.7φ
B20 0.8φ
B22 0.6φ
B24* 1.5φ
VC-2A 0.9φ
VOLUME %
100
84
50
16
4
2
1
0.5
0.25
0.125
0.063
0.032
-2
-1
0
1
2
3
4
5
B4
B17
VC-2A
B22
B20
B24*

6

129

0.23

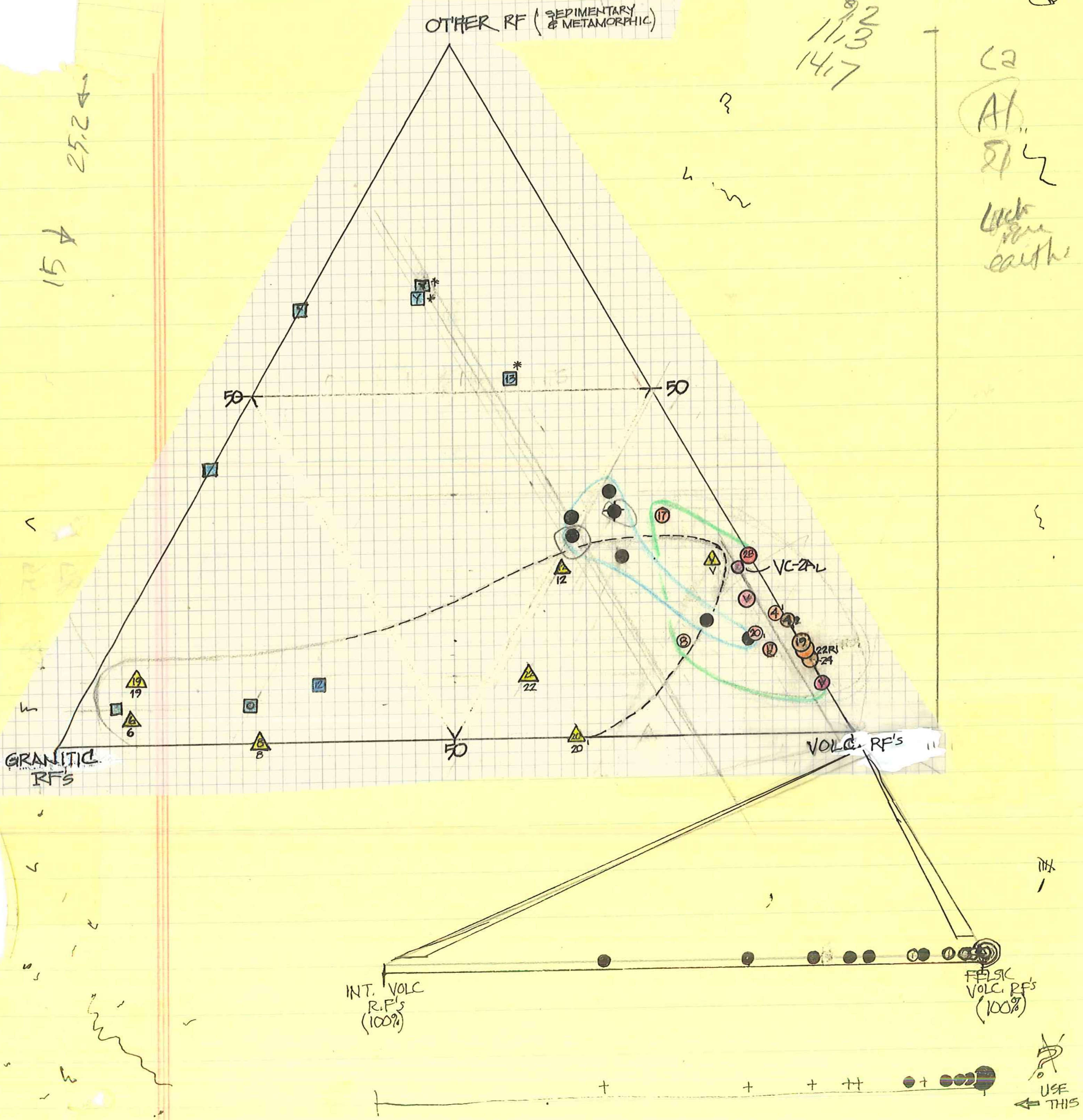
6.5
9.2
11.3
14.7

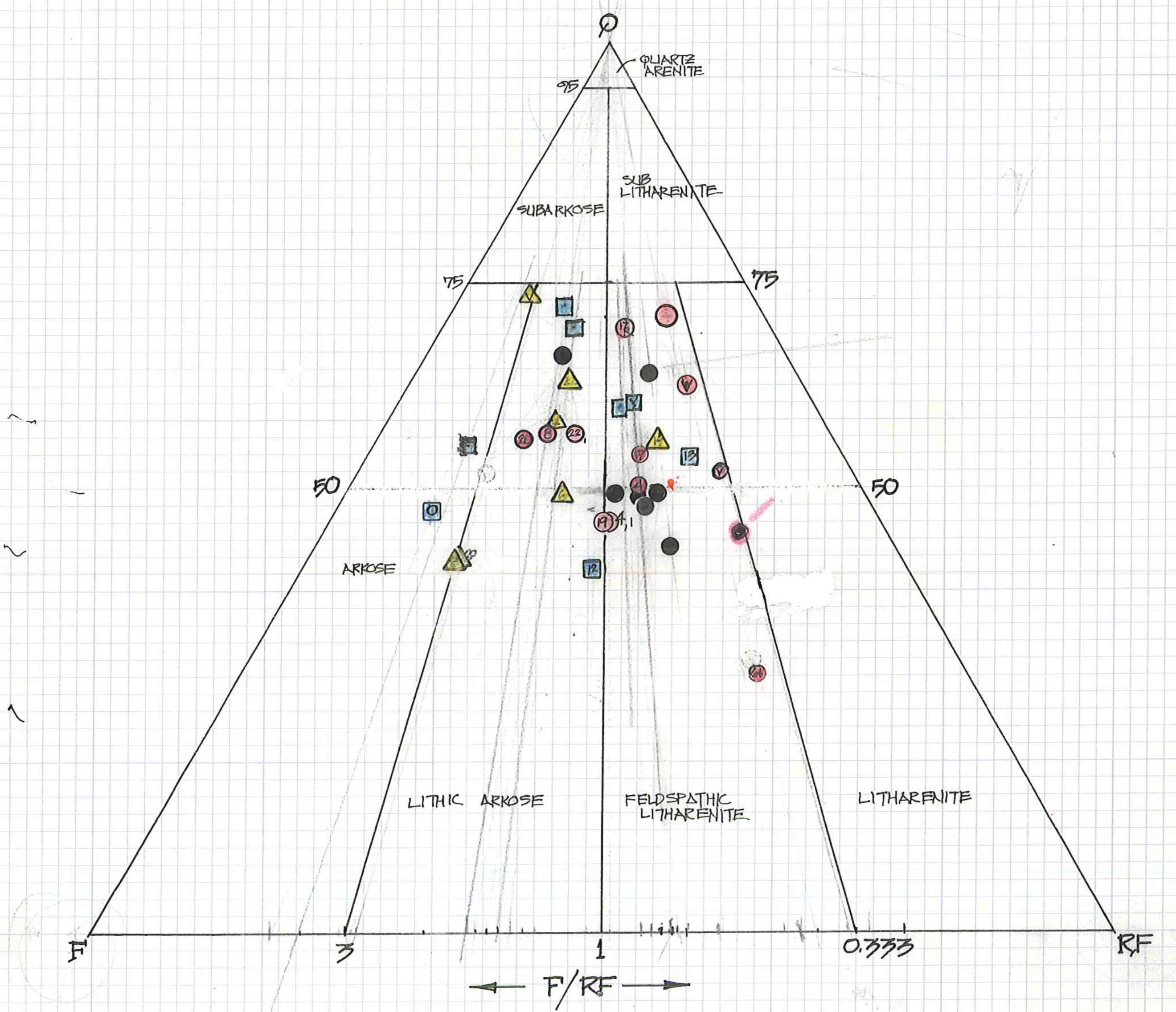
Ca
Al
Si

Look for earth

25.2

15



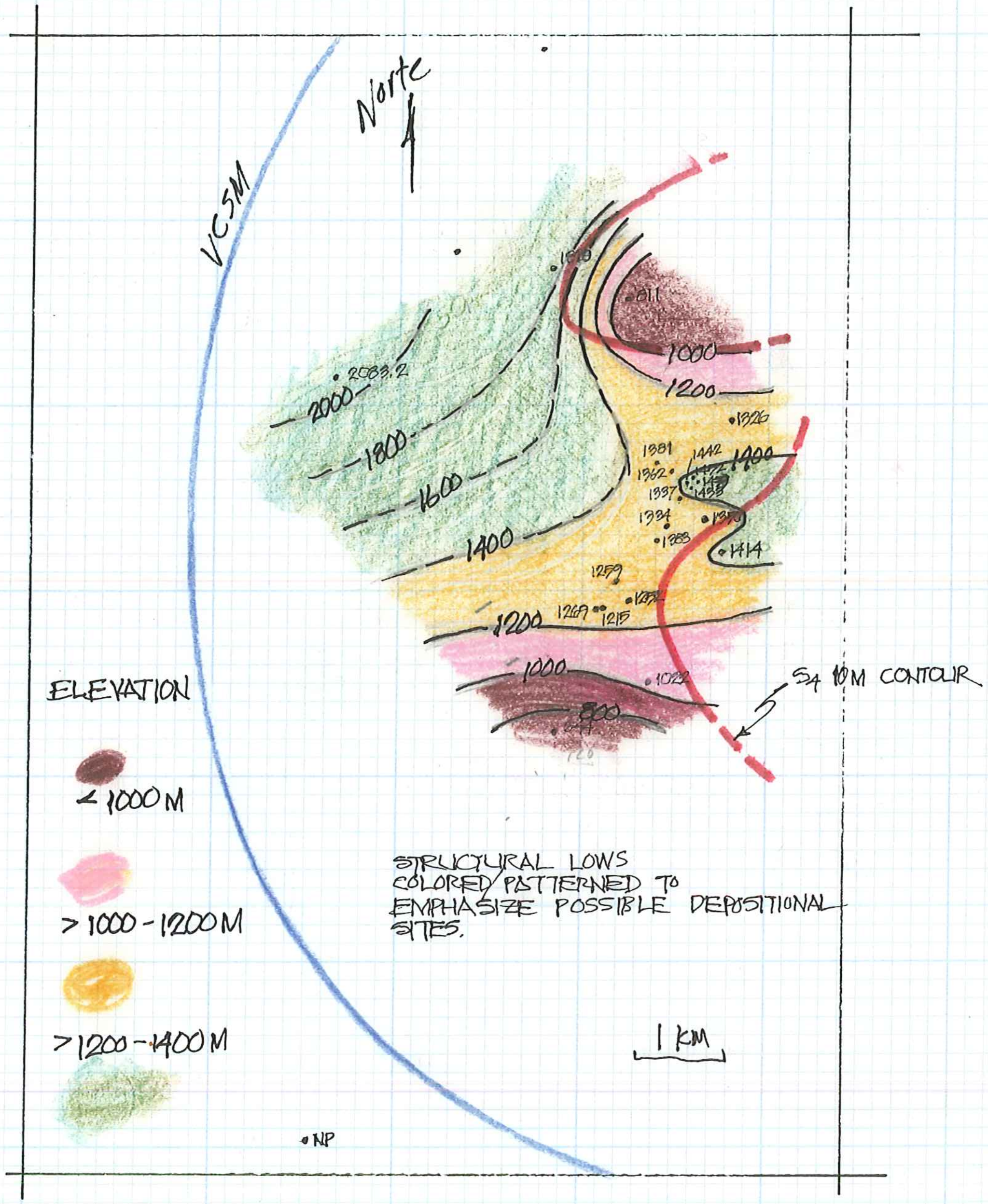


VALLES & TOLEDO CALDERAS: SANDSTONE CLASSIFICATION

subscript = relative depth of sample (1 is highest)

※ indicates borehole

- ◉ S_3 SANDSTONE
- △ S_2 SANDSTONE
- ☑ ABO FM. SANDSTONE
- ● SANTA FE SANDSTONE

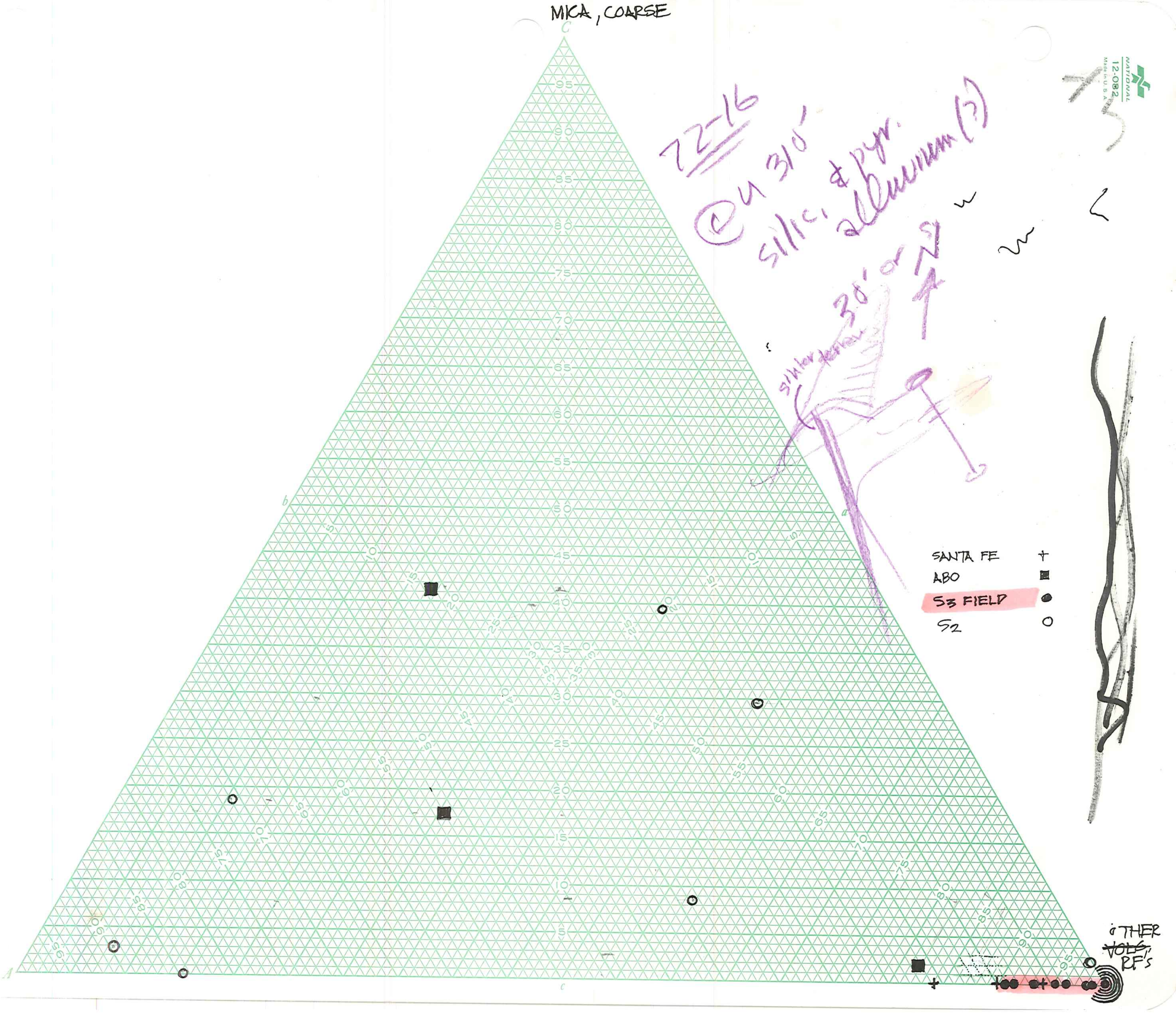


* STRUCTURAL CONTOUR MAP — TOP OF LOWER TUFFS

TABLE ___. CHARACTERISTICS OF THE S_3 SANDSTONE RELATIVE TO VARIOUS PYROCLASTIC AND EPICLASTIC DEPOSITS.

	S_3 SANDSTONE	① FELSIC PHREATOMAGMATIC SURGE DEPOSITS	② FELSIC, PHREATIC EXPLOSION BRECCIAS	③ EPICLASTIC FLUVIAL SANDSTONE	④ EPICLASTIC ALLUVIAL FAN SANDSTONE AND CONGLOMERATE	⑤ CALDERA-COLLAPSE MESOBRECCIAS
GEOMETRY	thin wedge, dramatically thickening at explored eastern margin	partial to complete radial wedge (near-vent); blanket or channel-fill (medial and distal, depending on topography	partial to complete radial wedge (near vent); blanket (medial and distal)	channel-fill to blanket	thick wedge	thin blankets, lenses and channel-fill deposits
THICKNESS	3–70 m (apparent thickness)	individual surge layers typically a few cm to <1 m but these can accumulate to thicknesses of 50 m (dry surges) to >100 m (wet surges) adjacent to their source vents.	up to 25 m adjacent to vents, but thinning exponentially outward	generally <30 m	commonly several hundred m or more adjacent to source	"few metres to tens of metres"
BEDFORMS	massive to indistinctly plane-bedded (VC-2A)	massive to plane-bedded (wet surges); antidunes, chute-and-pool structures, plane beds (dry surges)	massive to plane-bedded	cross-bedding, scour-and-fill structures; commonly a basal gravel with overlying upward-fining sequence.	cross-bedding, lenticular bedding, scour-and-fill structures, massive bedding in conglomerates	ND, but presumably massive
SOFT-SEDIMENT DEFORMATION ?	yes; S_3 shows convolute bedding and invades overlying ash-flow tuff (VC-2A)	common in wet-surge deposits	locally present	uncommon	uncommon	ND
SORTING	moderately sorted	poorly- to very well-sorted	very poorly- to poorly-sorted	poorly- to well-sorted	very poorly- to poorly-sorted	ND
MATRIX ABUNDANCE (<0.031 mm)	moderate to abundant (up to 47%)	sparse to abundant	moderate to abundant	moderate to abundant	abundant	ND
PREDOMINANT GRAIN SIZE (>0.031 mm)	0.11–0.28 mm (very fine to medium sand)	very coarse to very fine sand	highly variable; blocks >1 m in diameter locally present.	fine- to coarse sand; basal pebble gravel commonly present	generally interbedded sand and gravel; large boulders commonly present	ND, but most clasts <1 m
GRAIN MORPHOLOGY (>0.031 mm)	subequant to equant, less commonly lath-shaped or otherwise elongate; subangular to subrounded, rarely well rounded; shards sparsely vesicular	elongate to equant; blocky morphology common; grains commonly bound by curviplanar fracture surfaces; shards sparsely vesicular.	equant to subequant; subrounded to angular	subequant to equant; subangular to subrounded.	subequant; angular to subrounded	angular to subrounded; shape—ND
GRAIN COMPOSITION (>0.031 mm)	dominantly crystal and lithic fragments; few shards, pumice and accretionary lapilli	highly variable, ranging from dominantly shards and pumice to dominantly crystal and lithic fragments	exclusively cognate or accidental lithic fragments	highly variable; reflects source material		"rock types recognizable on caldera walls"
PRE-EMPLACEMENT HYDROTHERMAL ALTERATION	weak to moderate but ubiquitous; microcrystalline silica clasts common.	variable but commonly weak to absent	generally intense; opal or chalcedony common.	possible but generally absent		ND

① synthesized from Heiken and Wohletz (1985), Fisher and Schmincke (1984), Sheridan and Walker (1984), Wohletz and Sheridan (1979), Walker (1971), Self and Sparks (1968) Heiken and



72-16

@ u 310'

silici & pyr.

alluminum (?)

30' or 5'

				FRAMEWORK GRAINS										CEMENT										POROSITY		MISCELLANEOUS
				MONOMINERALIC GRAINS (AND PERTHITE)					ROCK FRAGMENTS																	
		NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE	CHERT	SED.	MET.	intm ~~FELT.~~ volc.	fels- VOLC.	QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx	CLAY RIMS	ACCESSORY MINERALS	MATRIX	PRIMARY	SECONDARY	
5	0.021		1																							
4.5	0.042		2			/																				
4	0.063		3										/													
3.5	0.084		4	/		//																				
	0.105		5	/									/													
3.0	0.126		6	/		//							/													
	0.145		7	/		//																				
2.5	0.168		8	/		//	/																			
	0.189		9			////																				
	0.21		10	//		𝍸																				
	0.231		11			/																				
2.0	0.252		12	//		////																				
	0.273		13			𝍸/							//													
	0.294		14	//		𝍸/							/													
	0.315		15	///									//													
	0.336		16	//		/																				
1.5	0.357		17	//		///							/													
	0.378	7	18	////		/							/													
	0.399	5	19	//		//							/													
	0.42	10	20	///		𝍸//																				
	0.441	2	21	/		/																				
	0.462	4	22	/		/							//													
	0.483	5	23	/		//							//													
1.0	0.504	5	24	/		/							///													
	0.525	1	25										/													
	0.546	2	26			/							/													
	0.567	4	27			////																				
	0.588	2	28	/		/																				
	0.609	10	29	///		////							///													
	0.630		30																							
	0.651	5	31			////							/													
	0.672	2	32	//																						
	0.693	3	33	/		//																				
0.5	0.714	8	34	///		///							/													
	0.735	3	35	/		/							/													
	0.756	2	36			//							/													
	0.777	2	37	/		/																				
	0.798	1	38	/																						
	0.819	2	39	//																						
	0.84	1	40	/																						
	0.861	1	41			/																				
	0.882	2	42	//																						

NOTES, COMMENTS

Φ	Q	F	RF	TL	
4.5-5		1		1	0.5
4-4.5				1	0.5
3.5-4	$1^{33.3}$	$2^{66.7}$		3	1.6
3-3.5	$2^{33.3}$	$2^{33.3}$	$2^{33.3}$	6	3.2
2.5-3	$2^{28.6}$	$5^{71.4}$	—	7	3.7
2-2.5	$4^{23.5}$	$13^{76.5}$	—	17	9.0
1.5-2	9^{30}	$16^{53.3}$	$5^{16.7}$	30	15.8
1-1.5	$14^{36.8}$	$15_{39.5}$	$9^{23.7}$	38	20.0
0.5-1	$10^{27.8}$	$19_{52.8}$	7	36	19.0
0-0.5	$10^{41.7}$	$10^{41.7}$	4	24	12.6
-0.5 to 0	$6_{35.3}$	$7^{41.2}$	4	17	9.0
-1 to -0.5	$2^{33.3}$	$2^{33.3}$	2	6	3.2
-1.5 to -1	0	$1^{33.3}$	2	3	1.6
-2 to -1			1^{100}	1	0.5
				190	

SAMPLE VC-2A 1206.3 (OTOWI)
NUMBER OF POINTS COUNTED 190
MAGNIFICATION 100X
DATE: 03/20/88

3ϕ

0,882

	FRAMEWORK GRAINS																	
			MONOMINERALIC GRAINS (AND PERTHITE)								ROCK FRAGMENTS							
	NUMBER OF GRAINS	SIZE (MICROMETER DIVISIONS)	MONOXLN. QUARTZ	POLXLN. QUARTZ	POTASSIUM FELDSPAR	PLAGIOCL.	PERTHITE				CHERT	SED.	MET.	PLUT.	fels; VOLC.			
0,903	1	1			/										/			
0,924		2																
0,945	1	3	/															
0,966	3	4	/		//													
0,987		5																
0ϕ — 1.0mm	2	6			//													
	13	7	𝍸 /		𝍸 //													
	4	8													////			
		9																
		10																
		11																
-0.5ϕ 1.41m		12																
	2	13			//													
	2	14	//															
	2	15													//			
		16																
		17																
-1ϕ 2.0		18																
	1	19			/													
	2	20													//			
		21																
		22																
		23																
-1.5ϕ 2.83 mm		24																
		25																
		26																
	1	27													/			
		28																
		29																
-2ϕ 4.0mm		30																
		31																
		32																
		33																
		34																
		35																
		36																
		37																
		38																
		39																
		40																
		41																
		42																

CEMENT										CLAY RIMS	ACCESSORY MINERALS	MATRIX	POROSITY		MISCELLANEOUS			
QUARTZ	CALCITE	DOLOMITE	SIDERITE	GYPSUM	ANHYDRITE	FeOx							PRIMARY	SECONDARY				

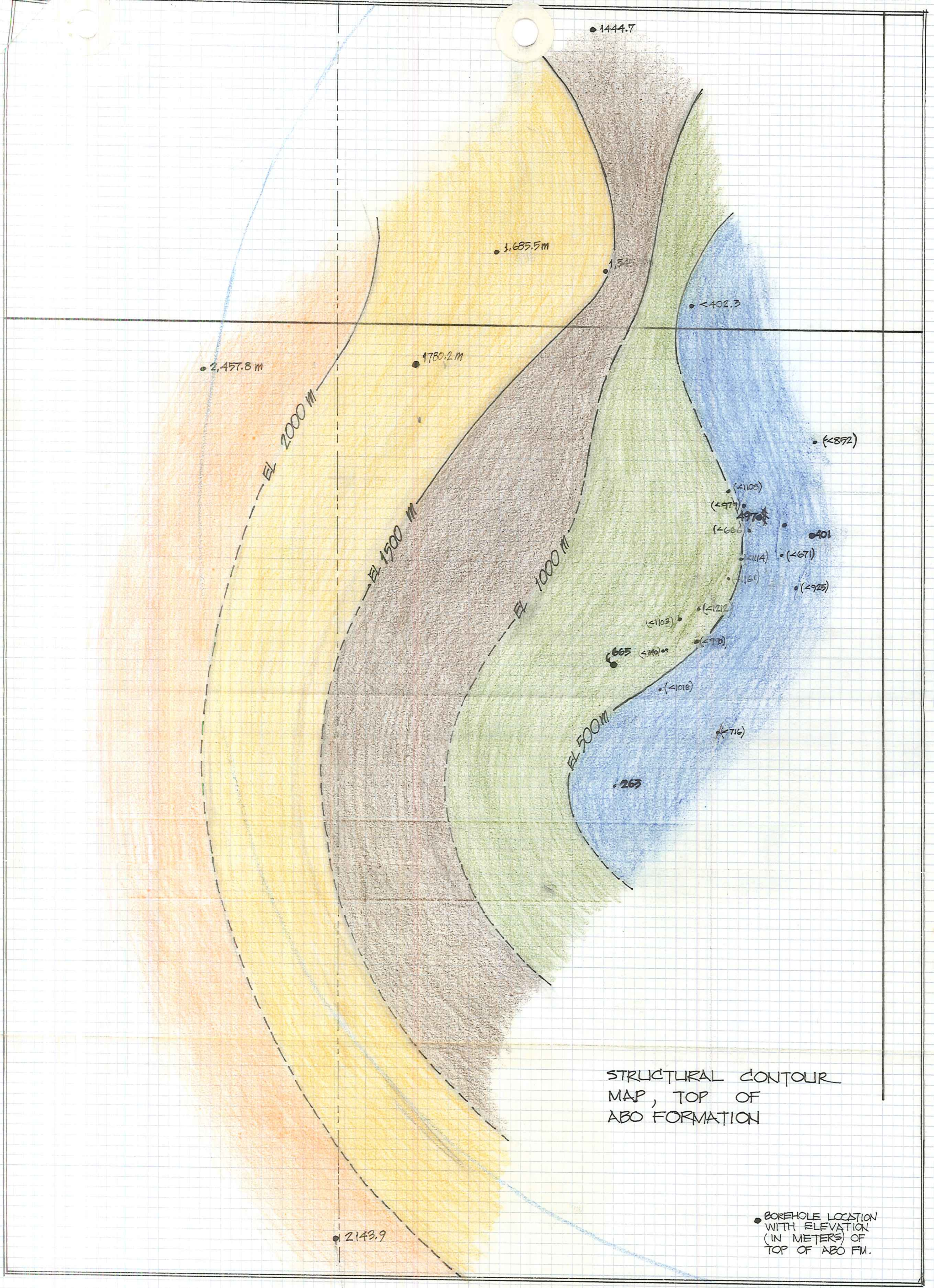
NOTES, COMMENTS

VC-24

1206.3
cont

SAMPLE ______
NUMBER OF POINTS COUNTED ______
MAGNIFICATION ______
DATE ______

896
448
224
112



STRUCTURAL CONTOUR
MAP, TOP OF
ABO FORMATION

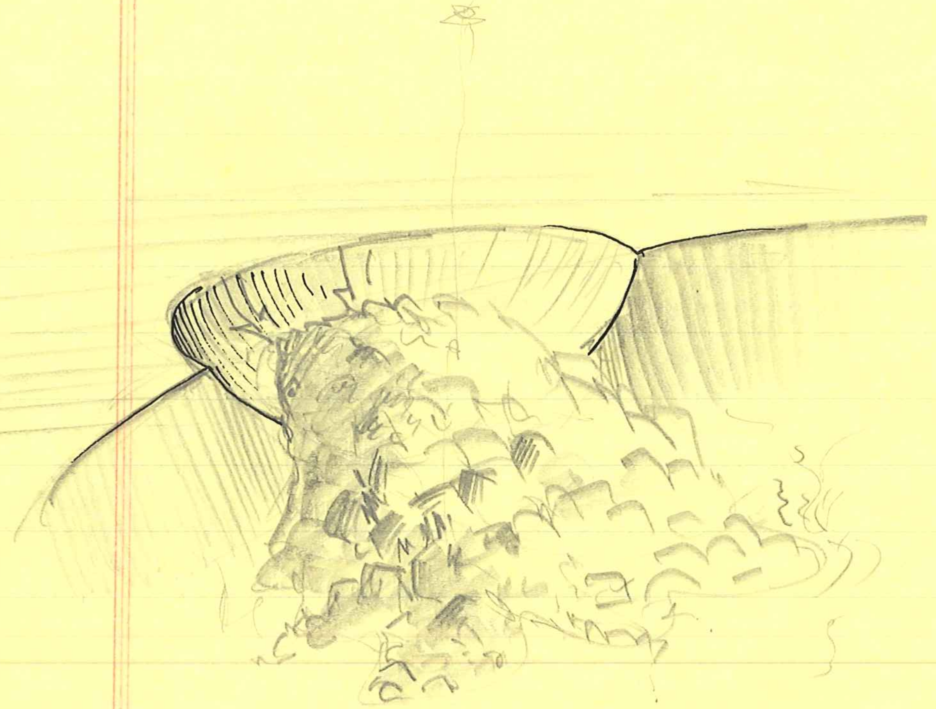
● BOREHOLE LOCATION
WITH ELEVATION
(IN METERS) OF
TOP OF ABO FM.

J. HULEN MAY 22, 1986

🟧
🟨
🟫
🟩
🟦

94
170
235

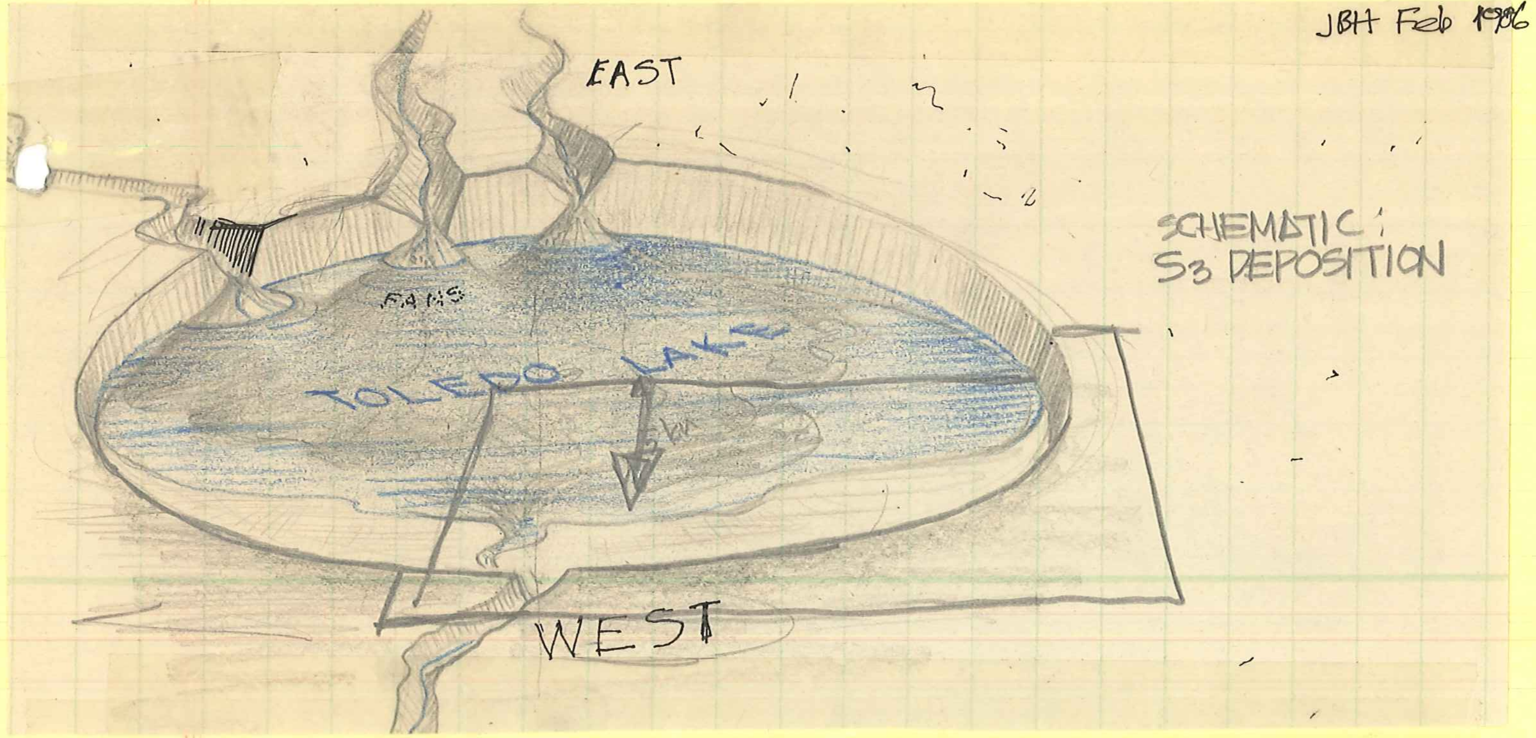
JBH Feb. 1986



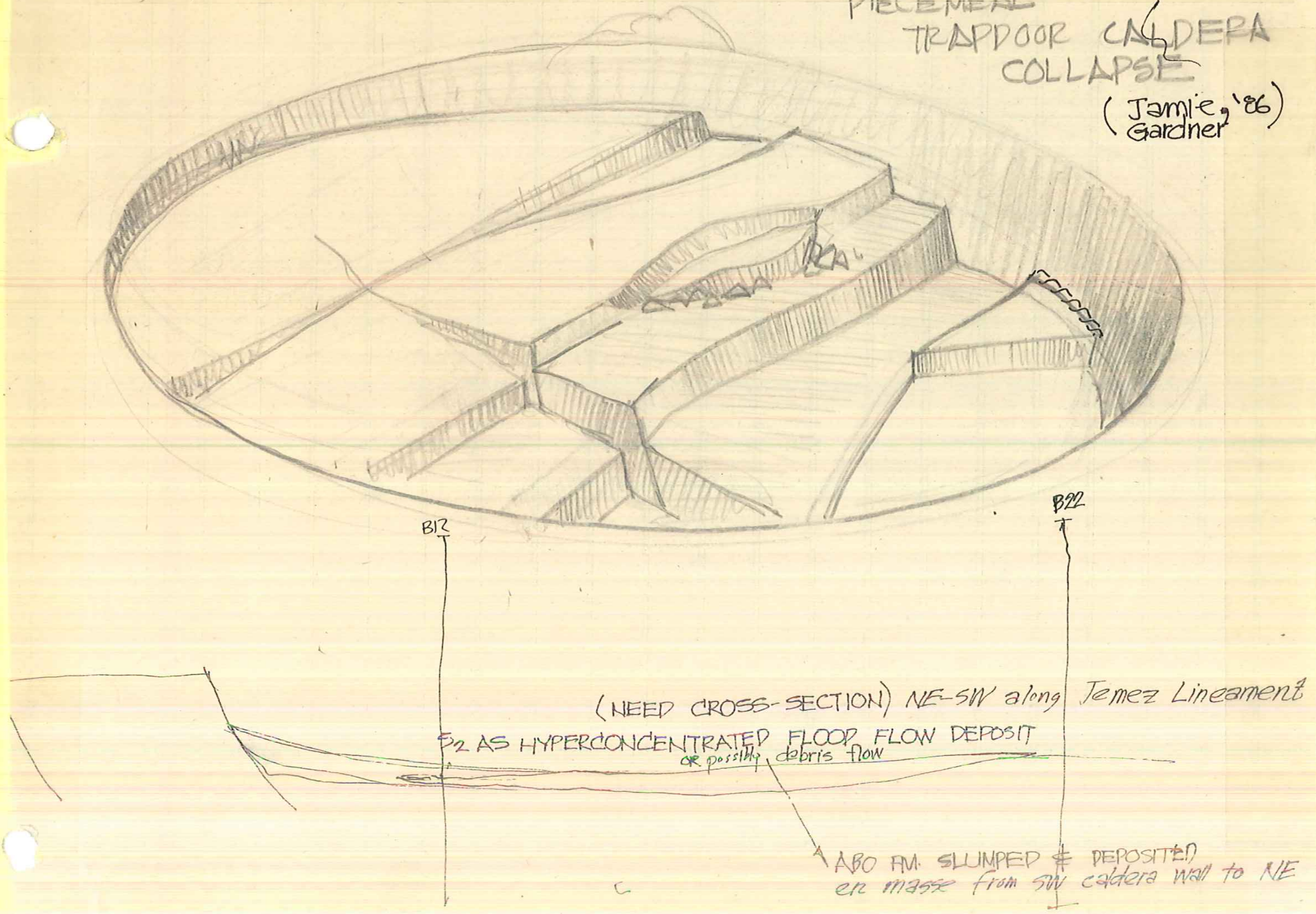
S_4 LANDSLIDE, POSSIBLY INTO LOWER TUFFS CALDERA, AT ALAMO CANYON SITE

prob. Lower Tuffs — JBH 01/89

JBH Feb 1986



SCHEMATIC:
S_3 DEPOSITION



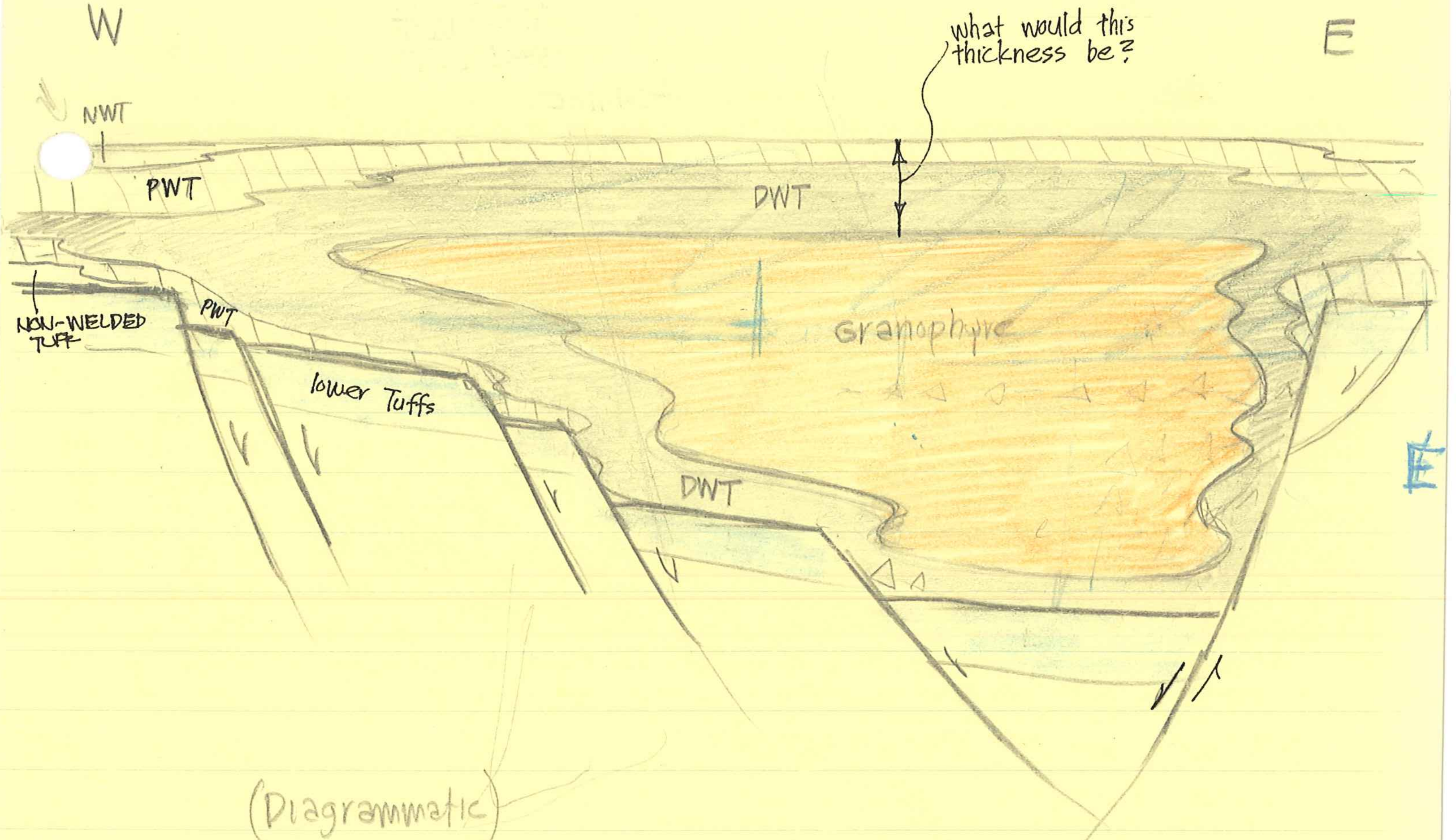
"PIECEMEAL"
TRAPDOOR CALDERA
COLLAPSE
(Jamie Gardner '86)

(NEED CROSS-SECTION) NE-SW along Jemez Lineament

S_2 AS HYPERCONCENTRATED FLOOD FLOW DEPOSIT
or possibly debris flow

ABO FM. SLUMPED & DEPOSITED
en masse from SW caldera wall to NE

Rio Grande Rift →

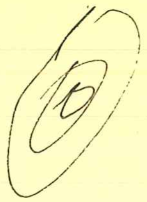


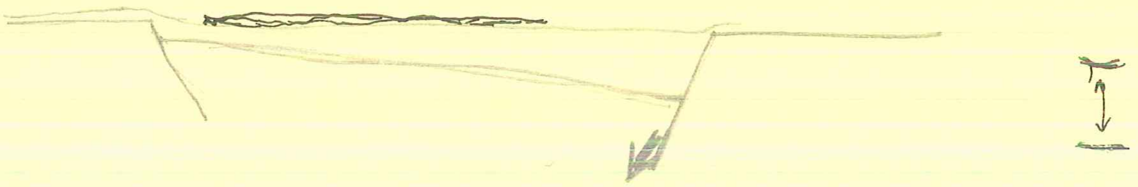
After Otowi eruption 1.4 my

Before S_3 deposition

would have flat, horizontal, upper surface (Smith & Bailey 1960)

depression after compaction





LIPMAN

7,8

Lipman, 1976

caldera-collapse breccias in Lake City, Silverton, San Juan & Uncompahgre → calderas (COLORADO)

2 types:

** megabx — huge blocks — fragmental nature of deposit may be obscure in outcrop.

** mesobreccia — ~~th~~ generally thin tabular deposits readily interpretable as having formed by rockfalls & rock slides from the caldera walls.

up to 2 km lateral extent

— most clasts < 1 m. in diameter

40 50

— few meters to few tens of meters thick.

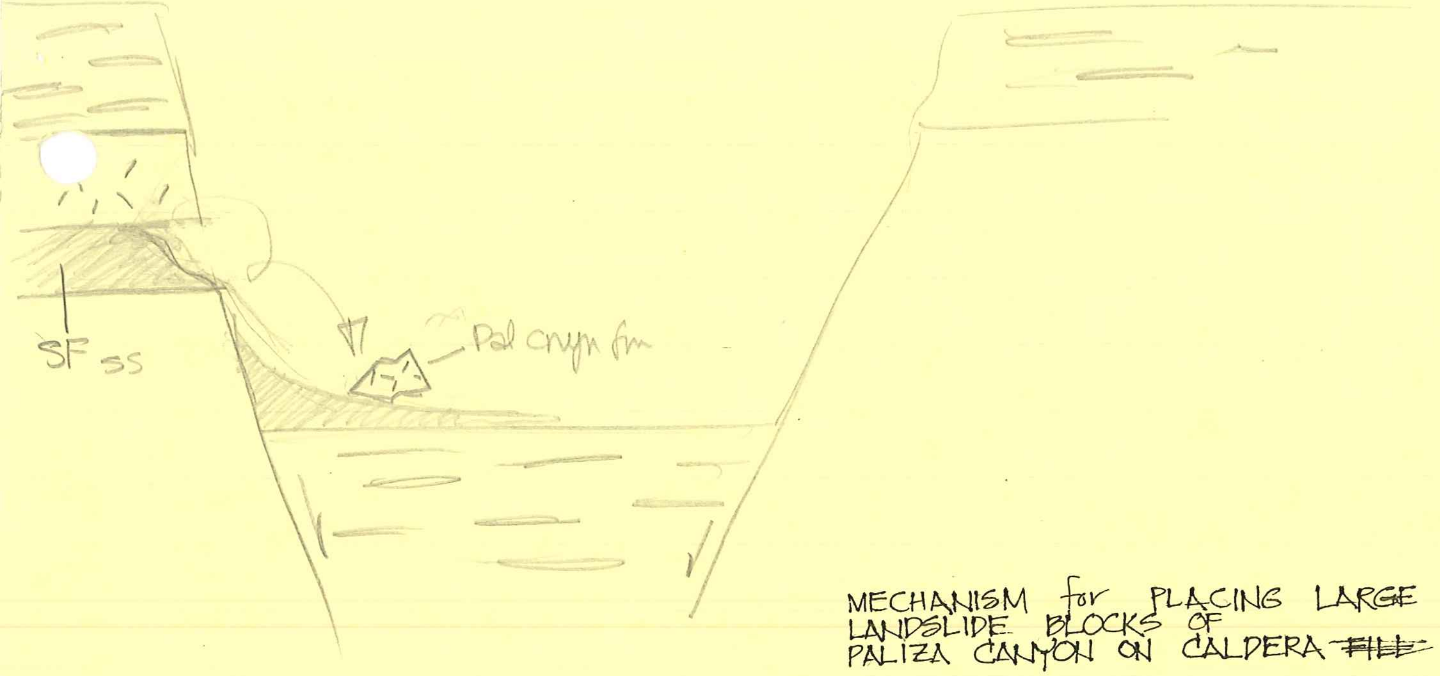
up to couple hundred feet or so.

— clasts mostly ∠ to sub∠ ~~and~~

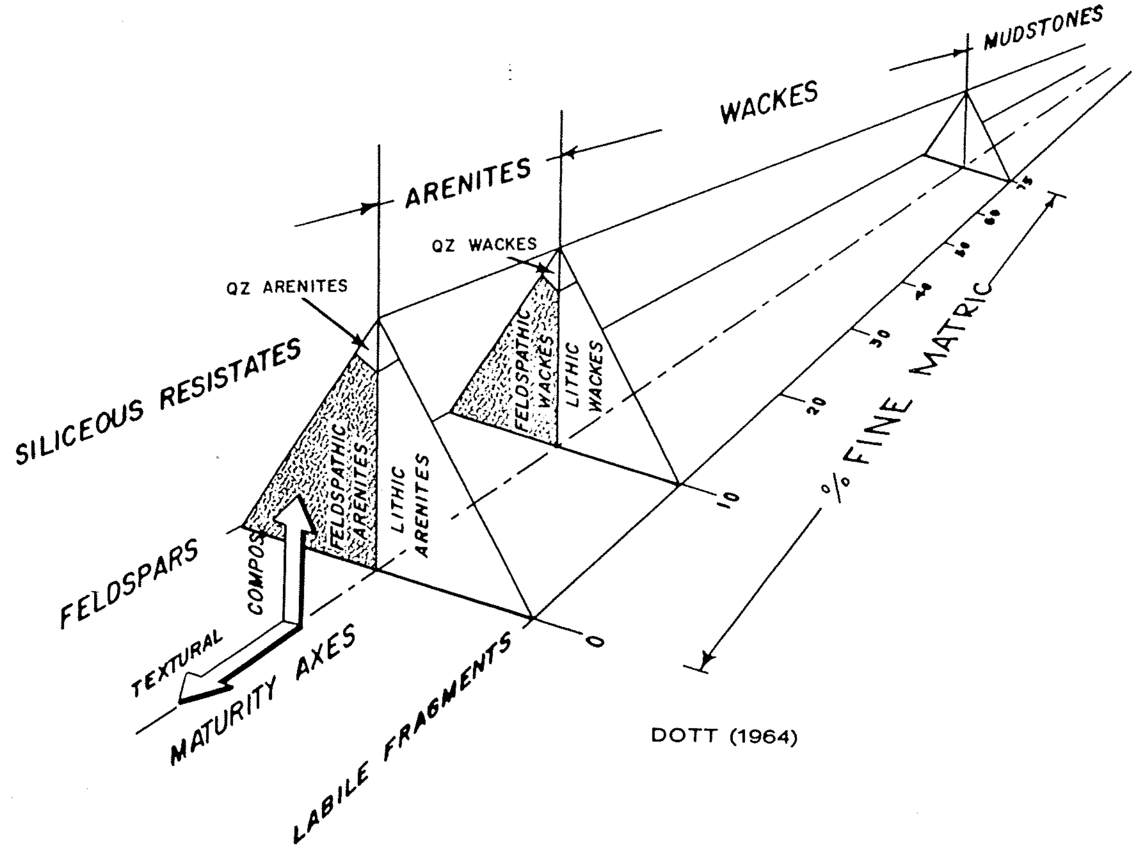
— clasts mostly of rx recognizable on the caldera walls (Santa Fe, Abiquiu)

△ thicker local lenses appear to fill channels.

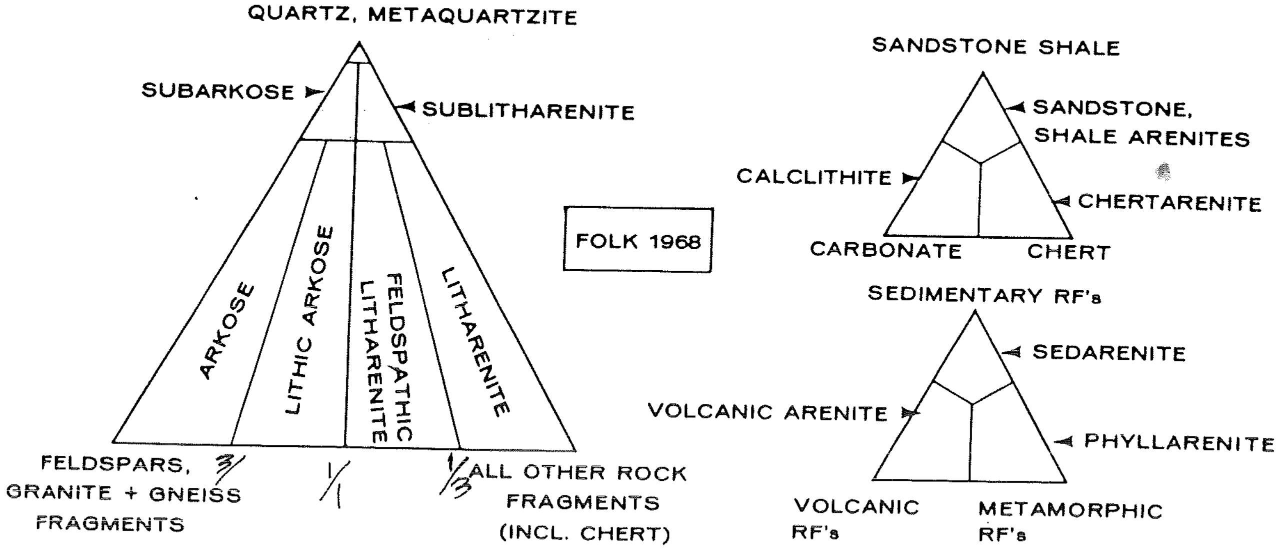
1.29
1.3
.77
1.001
1.77
.24
.70
0.8
1.3
.24
1.74



MECHANISM for PLACING LARGE LANDSLIDE BLOCKS OF PALIZA CANYON ON CALDERA ~~FILL~~ BTM.



DOTT (1964)



FOLK 1968

Sparks & Walker,
1973

"GROUND SURGES"

① non-uniform thickness (pinch & swell)
② internal stratification <u>not</u> parallel w/ top & btm
③ limited distance (5-10 km max) from source
④ relatively thin (< 1 m thick commonly)
⑤ well bedded, heterogeneous, degree of
sorting & grain size highly variable
from one bed to the next.

could the thick S_3 accumulations
have been built up by <u>multiple</u>
lithic-rich surges.

HYDROVOLCANISM—a review

Sheridan & Wohletz, 1983

* deposits — characteristically very fine-grained.

① explosions are all periodic or pulsing.

② hydroexplosions occur directly after water pours into the vent.

Valles → • Floods into newly-formed caldera depression

•

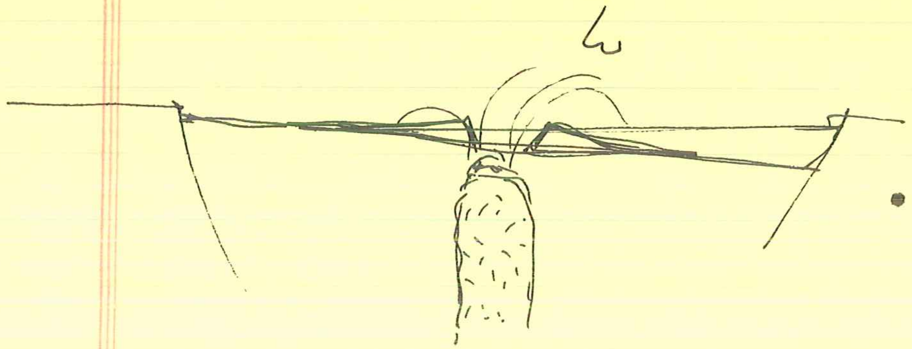
③ can fracture country rock near the explosion

→ direct pouring of water into an open vent.

- within a really thick ash-flow tuff the core will remain very hot for a long period of time >700°C? —
- therefore that core may act as a shallow intrusive —
  what if water percolates down onto it? —
  say, from caldera lake?
  would that generate phreatic explosions?

another possible mechanism:
draining a caldera lake catastrophically → remove hydrostatic pressure → BOOM
see Muffler & White, 1971

LOOKS TO



- if central vent: initial phreatomagmatic activity?

IF fsp and qtz grains were derived from non-welded Otowi just by erosion; then surely some ~~quartz~~ & ~~fsp~~ (less so) feldspar should be euhedral, just slightly rounded, and locally reach 3 mm. or so diameter (they don't)

Hedenquist & Henley, 1985

<u>Waiotapu</u> phreatic explosion debris

→ selds

V. poorly sorted

∡ to subrounded ← (in vent) ???

up to 1 m. in size

- VARIOUS LITHOLOGIES
- SELDOM ANY INTERNAL BEDDING
- matricies commonly rich in alteration minerals

The presence of accretionary lapilli, ash balls in the S_3 ~~must m~~ could mean: (1)

(1) these lapilli and other clasts in the sandstone were deposited at the same time w/ subsequent reworking. The lapilli & ash balls, being quite soft (presumably) wouldn't survive much in the way of reworking

Self & Sparks, 1978 —

Accretionary lapilli — really do originate in many ways: * **RAIN-FLUSHING** very common way to make them.

Wohletz and Sheridan, 1979

surge deposits **can** consist of dominantly ACCESSORY or ACCIDENTAL clast

(v. wide variation)

so couldn't eliminate the S_3 as a surge on that basis alone

SORTING & SIMILARITY OF GRAIN SIZE THROUGHOUT W-CENTRAL VALLES **IS** A GOOD WAY TO ELIMINATE IT, THOUGH

HEIKEN & M^c^COY 84 (Minoa.

3^rd^ phase of Minoan Tuff.

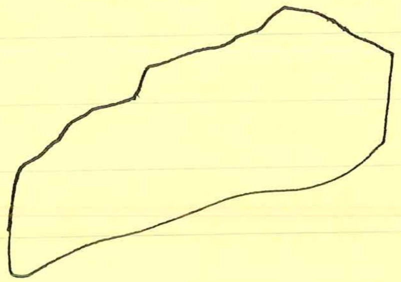
has PROXIMAL TUFF RING → CAN BE LITHIC-RICH – 5-40% LITHICS

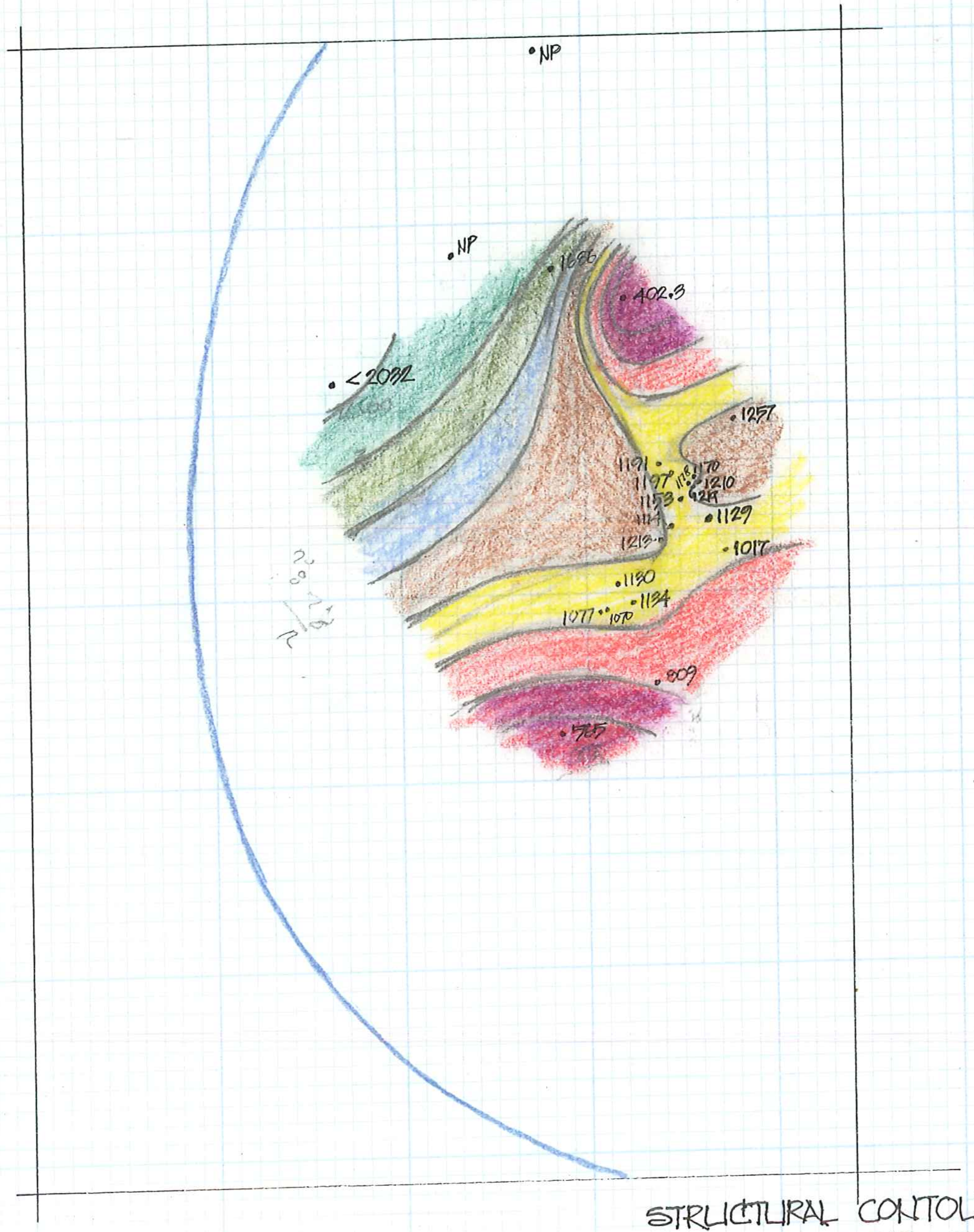
up to 55 m thick

massive but with locally faint bedding

→ lithic clasts usu. scattered throughout fine ash matrix – LITHICS ARE ANGULAR

→ many pumice surfaces have bread-crust ~~bombs~~ texture





STRUCTURAL CONTOUR MAP
BASE OF LOWER TUFFS