

for: Unocal Geothermal Division, Unocal Corporation -- Daniel Carrier

16 Cuttings Samples
Clay-Fraction XRD

MINERALOGY, APPROX. WT.% (or) RELATIVE ABUNDANCE

SAMPLE NO.

SMECTITE

ILLITE & PHENIG.
UNDIVIDED

CHLORITE

MIXED-LAYER
CHLOR/SMECT.

BIOTITE

TALC

6-1 2344m

5

8

*83

2

6-2

TR?

70

30

6-3

2

93

5

6-4

3

5

92

6-5

100

6-6

13

87

6-7

1

2

97

6-8

15

10

5

*70

8-1

8

42

44

6

8-2

5

15

75

5

8-3

3

16

72

9

8-4

1

11

82

6

8-5

1

49

50

TR?

8-6

4

11

72

13

8-7

3

*23

58

16

8-8

26

41

33

* INCLUDES MINOR
PHENIGITE

* PROBABLY INCLUDES
SOME DELAONITE

MM = PREDOMINANT M = MAJOR m = MINOR Tr = TRACE ? = TENTATIVE IDENTIFICATION



SUMMARY OF X-RAY DIFFRACTION ANALYSIS
UNIVERSITY OF UTAH RESEARCH INSTITUTE, EARTH SCIENCE LABORATORY

for: Unocal Geothermal Division, Unocal Corporation -- Daniel Carrier

16 Cuttings Samples Bulk XRD		MINERALOGY, APPROX. WT.% <input checked="" type="checkbox"/> (or) RELATIVE ABUNDANCE <input type="checkbox"/>																					
		QUARTZ	PLAGIOCL.	K-FELDSP.	CALCITE	CLINOPYROX.	ACTINOLITE	HORNBLITE*	EPIDOTE	PREHNITE	ANHYDRITE	ILMENITE #OR	MAGNETITE	HEMATITE	PYRITE	SPHENE/LEUCOPHANE	WARRAKITE	SMECTITE	MIXED-LAYER CHLOR-SMECT.	ILLITE AND PHENITE	BIOTITE	CHLORITE	TALC
SAMPLE NO.		14	51		TR	3	2	3	1		TR	2	TR	2	TR		1		2	16	3	TR	
	6-1 7690-7700	42	30	22					TR		TR							4	TR?	2			
	6-2 7160-70'	45	21	16		TR	2		1		TR	TR	TR	TR	1		TR	11	TR?	3			
GMF	6-4 5710-20'	4	50	3	2	7	3		6		5	TR	TR	8		TR		1		11			
7A-6	6-5 57260-70'	11	45	11		3	2		7		1	TR	TR	8						12			
	6-60 4620-30	11	42	9		13	3		7	1	1		1	9		2				13			
	6-7 4910-20	19	38	10	TR	13	2		5	2	1		1	8				TR		13		TR. UNKNOWN HIGH N. HIGH RE- LIEF, LOW BIREFRINGENCE MINERAL	
	6-8 8230-40	32	40	17	TR		1		1		1	TR	TR	TR		1	TR	1	3	1			
	8-1 6460-80	16	33	9	2	10	1		3		2	5		8		TR	TR	5		6		TR UNKNOWN, HIGH N, MOD-HIGH BIREFRINGENT SIM. TO ANHYDRITE *	
	8-2 6140-60	11	34	7	TR	13	2		4		2	5	TR	9	1	TR	TR	2		10			
	8-3 5840-60	17	35	11	1	10			2		1	4	TR	6	TR?	TR	TR	3		10			
GMF	8-4 5400-20	13	35	8	1	5			5	TR	1	3	1	8	TR?	TR	TR	3		9		8	
68-8	8-5 4660-80	20	30	5	1	5			4		TR	4	2	8	5	TR	TR	6		10			
	8-6 4120-40	16	33	5	3	52	1(OR) 1	TR			2	4	TR	9		TR	32	3		7+		10	
	8-7 3200-20	7	43		2	15					3	3		8		TR	TR	4		3		12	
	8-8 2660-80	45	29	19							TR	TR		2		1		2		2			
	* REPLACES ORIGINAL MATRICES.																					* INCLUDES MINOR MIXED-LAYER CHLOR/SMECT.	
	⊕ PHENITE = BROWN TO GREEN IRON-RICH ILLITE ANALOGUE																					* BJT W/ INCLINED EXTINCTION	
																						⊙ AMORPHOUS BELOW DETECTION LIMIT; MAY INCLUDE METASTABLE GLASS.	

MM = PREDOMINANT M = MAJOR m = MINOR Tr = TRACE ? = TENTATIVE IDENTIFICATION



SUMMARY OF X-RAY DIFFRACTION ANALYSIS

UNIVERSITY OF UTAH RESEARCH INSTITUTE, EARTH SCIENCE LABORATORY

Sample No.	Rock Types													NOTES, OTHER
	① BASALT OR ANDESITE	② PORPHYRITIC SILT OR ANDESITE	③ MICRODIORITE BA-	④ MICRODIORITE #	⑤ QTZ LATITE RHYODACITE	⑥ PORPHYRITIC RHYODACITE OR RHYODACITE	⑦ QUARTZ RHYODACITE	⑧ BIOTITE MICRO- GRANODIORITE	⑨ BIOTITE MICRO- GRANODIORITE	⑩ HPL-PTZ RHYODACITE	⑪ LAS-PTZ RHYODACITE	⑫ ULTRAPERIDOTITE (SANDWICH) CANIC ROCK *	⑬ VEIN FRAGMENTS (?) *	
6-1									MM	M	M			
6-2				MM*								TR		
6-3		M	M	MM*								M		M-PTZ-SER. ROCK
6-4	M	M	M									M	M	TR-PTZ-CHL-ROCK
6-5	M	M	TR	M	M							M	TR	RHYODACITE (3) POST-DATES ANDESITE
6-6	MM	M	TR	TR?								M		CHIP OF PERLITE CEMENT
6-7	MM	M	TR									M	TR	
6-8	TR						MM	M				TR	TR	#
8-1	M	M	TR	TR		M						M	TR	ALSO TR LOST CIRCULATION MATERIAL
8-2	MM	M	M	M								M		
8-3	M	M		M	M							TR	M	CHALCEDONY CHIP
8-4	M	M	TR	TR	M							M		"
8-5	M	M	TR		TR?							M		TR-PTZ-SER. ROCK
8-6	MM	M										TR		
8-7	M	MM										TR	M	MICROXLN SER.-PTZ-CHLORITE ROCK
8-8	TR			MM*								TR	TR	
* QUARTZ LATITE. ALL PROBABLY SLIGHT VARIATIONS OF THE SAME ROCK TYPE. PROBABLY INTRUSIVE, PROBABLY INITIALLY GLASSY IN PART. WELL-DEVELOPED SPHERULITIC, GRANOPHYRIC, & MICROFES- MATITIC TEXTURES (NOTE: COULD ALSO BE A DOME OR THICK FLOW).														① & ② PROBABLY JUST DIFFERENT TEXTURAL VARIETIES OF SAME ROCK TYPE.
# ORIGINAL MAFICS IN GRANODIORITE REPLACED BY FINE-CRYSTALLINE, GREEN-BROWN BIOTITE & GREEN ACTINOLITE. BOTH POSSIBLY DELTIC.														③ & ④ AS ABOVE.
* A FEW FRAGMENTS ARE MODERATELY- TO WELL-FOLIATED, INTERMEDIATE BETWEEN HORNFELS & SCHIST. MAY INCLUDE MINOR INTERMEDIATE-COMPOSITION METAVOLCANIC ROCK.														
+ MASSIVELY REVL'D, BUT RECOGNIZABLE APPARENT VOLCANIC TEXTURE. ?														

16 Cuttings Samples: Rock Types Observed During Reconnaissance Petrography

Sample No.	Veinlets												
	QTZ	CAL	KF ± QTZ	EP ± Q, KF	ACT ± Q, KF, EP	CHL ± QTZ	*PHENGITE ± ILLITE CHL, QTZ	FRESHNITE ± EP, QTZ, KF	WAIKAKITE ± EP, QTZ, KF	LEUCOXENE ± EP, QTZ, KF	BIOTITE		
6-1	✓			✓	✓						✓		CPXN
6-2	✓		*✓										
6-3	✓		*✓	✓	⊕	✓							ILLITE-PYRITE
6-4	✓	✓		✓		✓							CHLORITE-CALCITE
6-5	✓	✓ _{TR}		✓		✓				✓			CHL-EP-LEUCOX
6-6	✓	✓ _{TR}	✓	✓	✓	✓		✓					"WITH" PY & KPSP ACT-Q- CH-EP- FRESHN.
6-7	✓	✓	✓?	✓		✓		✓					ONE VULT FRAG. EP ± Q UNKNOWN HIGH RELIEF HIGH N, LOW BIREP. MINERL.
6-8													
8-1	✓	✓	✓	✓		✓	✓						CAL-CH-PHENGITE; Q-CAL-ILLITE-CHL
8-2	✓	✓		✓		✓	✓						WAIKAKITE-CHLORITE- LEUCOXENE
8-3	✓	✓		✓		✓	✓						PHENG-CHL-CALCITE
8-4	✓	✓		✓		✓	✓ _{TR}	✓ _{TR}					± CH-EP-LEUCOX
8-5	✓	✓		✓		✓	✓		✓				PHENG-CHL-CHALCEDONY PHENG-WAIKAKITE
8-6	✓	✓	✓ _{CAL}	✓		✓	✓						CHL-CAL-HEM CHL-CAL-QTZ CHL-EP- LEUCOX.
8-7	✓	✓											
8-8	✓		*✓										QTZ-HEMATITE
* PROBABLY MICROSPHATITIC Q-KPSP INTER-GROWTH													
⊕ POSSIBLY FRESHNITE VIEWED ⊥ TO C AXIS													
TR = SCATTERED TRACES													
* PHENGITE = GREEN TO BROWN (TRANSMITTED LIGHT), IRON-RICH ILLITE ANALOGUE.													

16 Cuttings Samples: Veinlets Observed During Reconnaissance Petrography