SSGF
ELMORE-IW3

Well Elmore IW-3, Lithology & Mineralogy Recalc. to 30-ft Intervals JH 02/03/05

Euhedral Hydrothermal Crystals	Loose Sand in Part	Lost-Circulation Material	Redbeds	Slickensides	Alternate Interval	Depth Interval	GRVL.	ss	chl/ss	MDS & (slts)	NOD ANH	GG & uBX	VNLTS	CA/MDS	CA/SS	EP	AC	PY	PO	HM	SP/GN	CPY	BN	RHY TUFF	CV	CMT
						0-496'	No Sample																			4
					64'	496-560'	0.5	1.5		98	Tr															
						560-620'				100				VS	VS											
						620-680'				100	Tr			VS	VS											
						680-740'		30^{VFG}		70	Tr			VS	VS											
						740-800'		35^{VFG}		65				VS	VS											
						800-860'		73^{VFG}		27	Tr			VS	VS											
	X					860-920'		67^{MG}		33				VS	M											
	X					920-980'		64^{MG}		36				VS	M-S										CV ?	
	X					980-1040'		40		60				VS	VS										CV	
						1040-1100'		55		45				VS	VS											
						1100-1160'		5		95				VS	VS			0.3								
						1160-1220'		8		92				VS	VS											
						1220-1280'		5		95				VS	VS											
						1280-1340'		19		81	Tr			VS	VS											
						1340-1400'		30		70	Tr			VS	VS											
						1400-1460'		58		41	1			VS	VS											
						1460-1520'		40		59	1			VS	VS											
						1520-1580'		4		95	1			VS	VS			Tr								
						1580-1640'		6.5		93	0.5			VS	VS											
						1640-1700'		14.5		84	1.5			VS	VS											
						1700-1760'		8		89	3			VS	VS											
						1760-1820'				100?				VS	NO SS										CV	
						1820-1880'		58		42				VS	VS										CV	
			X			1880-1940'		29		71				VS	VS			Tr							CV	
						1940-2000'		30		70				VS	VS			1.3				0.1			CV	35
						2000-2060'		71		29				S	M-S			1.3				0.2				
					90'	2060-2090'		56		41				M-S	M			1.3				0.1				
						2090-2150'		37		63				M-S	M			0.7								
						2150-2210'		47		53				M-S	W-M			0.3			Tr					
	X					2210-2270'		66		34				M-S	W-M			0.3								
						2270-2330'		46		54				M	M-S			1			0.1	0.1				
						2330-2390'		46	Tr	54				M	M-S			0.2								
						2390-2450'		53		47				M	M-S			0.2								
						2450-2510'		69		31				M	M-S			0.4								
						2510-2570'		73		27				M-S	S			0.3								
X						2570-2630'		61		39				S	S	Tr		0.3								
						2630-2690'		57		43				M-S	S			0.3								
						2690-2750'		39		61				M	S			0.2								
						2750-2810'		57		43				M	S			0.5								
						2810-2870'		69		31				M	S			0.7							CV	
						2870-2930'		48		17				M	S			0.2								35
						2930-2990'		88		6				M	S			0.1								6
						2990-3050'		73		12				M	S	Tr		0.1								15
						3050-3110'		66		20				M-S	S			Tr								14
						3110-3170'		44		42				M-S	S			Tr								14
						3170-3230'		72		28				S	S			0.2								20
						3230-3290'		35	VW	60				M	S			0.1								5
						3290-3350'		30	VW	62				S	S			Tr								8
			X			3350-3410'		48	VW	52				M-S	S			Tr								
						3410-3470'		35	VW	65				M-S	S			Tr								
			X			3470-3530'		33	VW	67				M	M-S											
	X		X			3530-3590'		46		53				M	M											
			X			3590-3650'		43	VW	57				M	M											
			X			3650-3710'		82		19				M	M											
	X		X			3710-3770'		46		54				M	M											
			X			3770-3830'		53		47				M	M											
						3830-3890'		43		57				M-S	M-S			0.1								
						3890-3950'		63		37				M-S	M-S										CV	

Well Elmore IW-3, Lithology & Mineralogy Recalc. to 30-ft Intervals JH 02/03/05

Euhedral Hydrothermal Crystals	Loose Sand in Part	Lost-Circulation Material	Redbeds	Slickensides	Alternate Interval	Depth Interval	GRVL.	ss	chl/ss	MDS & (slts)	NOD ANH	GG & uBX	VNLTS	CA/MDS	CA/SS	EP	AC	PY	PO	HM	SP/GN	CPY	BN	RHY TUFF	CV	CMT
						3950-4010'		40	Tr	60				M	S			0.1								
	X					4010-4070'		72		28				M	M											
						4070-4130'		85		15				M	W-M											
						4130-4190'		79		21				W-M	W-M											
						4190-4250'		25		75				W	W-M						Tr					
						4250-4310'		18		82				W-M	W-M			0.2								
						4310-4370'		62		38				W-M	W-M											
				X		4370-4430'		35		65		Tr		W-M	M-S										CV	
						4430-4490'		32	VW	68				M	M-S											
						4490-4550'		33	VW	67				M	M-S											
						4550-4610'		25	VW	75				M	M-S			Tr								
						4610-4670'		24	VW	76				M	S			Tr								
					70'	4670-4740'	No Sample																			
						4740-4800'		11	VW	86	3			M	S			0.1								
			X			4800-4860'		36	VW	63.5	0.5			W-M	M-S			0.1								
			X			4860-4920'		34	VW	65	1			W-M	M-S			Tr								
						4920-4980'		32	VW	66.5	1.5			M	S			Tr				Tr				
					50'	4980-5030'		32	VW	67	1			M	S											
						5030-5090'		48	VW	51.5	0.5			M	S			Tr								
			X			5090-5150'		57	Tr	42.5	0.5			W-M	M-S			0.1								
			X			5150-5210'		50	Tr	50				W-M	M-S											
						5210-5270'		58	VW	42				W-M	M-S			0.3				Tr				
						5270-5330'		74	Tr	26				W-M	M-S			0.3				Tr				
X						5330-5390'		66	W	33.5	0.5		3	W-M	W			1.5			0.2	0.2				
X						5390-5450'		46.5	Tr	51	1		1.5	W-M	W			1			0.4	0.2				
						5450-5510'		38.5	VW	61	Tr		0.5	W	W-M			0.3			0.1	Tr				
				X		5510-5570'		32.5	VW	67		Tr	0.5	W	W-M			1			0.1	0.2				
				X		5570-5630'		14	W	30		0.5	0.5	W	W-M			0.3						55		
				X		5630-5690'		8	VW	72			Tr	W-M	W			0.1						20		
						5690-5750'		13	Tr	84.5			0.5	W-M	M-S			0.1				Tr		2		
						5750-5810'		17		82.5			0.5	W-M	S			0.2								
						5810-5870'		29	VW	71				W-M	M-S			0.1								
						5870-5930'		21	VW	79				W-M	M-S			0.2			Tr					
						5930-5990'		46	W	54				W-M	M-S			0.3				Tr				
						5990-6050'		45		55	Tr			W-M	W-M			0.3				0.1				
					50'	6050-6100'		57		43				W-M	M-S			0.3				0.1			CV	
						6100-6160'		55		44.5			0.5 ca	W-M	S			0.2			Tr	Tr				
						6160-6220'		62		38				M	S			0.1								
						6220-6280'		44		56				W-M	S			Tr								
						6280-6340'		48		52				W	S			0.1								
						6340-6400'		40		60				W-M	S			Tr								
						6400-6460'		56.5		43			0.5 ca	W	S			0.1				Tr				
						6460-6520'		47		52.5			0.5 ca	W-M	M-S			Tr	Tr			Tr				
						6520-6580'		35		65			Tr ca	W-M	M-S	Tr		Tr								
						6580-6640'		26		74			Tr ca	W-M	M-S			Tr	Tr			Tr				
						6640-6700'		13		86	0.5		0.5 ca	W-M	S			0.5	0.4			Tr				
						6700-6760'		20		79	0.5		0.5 ca	M	S			0.6	Tr			Tr				
						6760-6820'		17		82	1		Tr ca	M	S			0.4	Tr			Tr	Tr			
						6820-6880'		23		76.5	0.5		Tr ca	M	S			0.4	0.2			Tr				
						6880-6940'		28		71.5	0.5			M	S			0.4				Tr				
						6940-7000'		46	VW	54				W-M	S			0.4	Tr			Tr	Tr			
						7000-7060'		47	VW	53	Tr			W-M	S	0.3		0.6	Tr			Tr	Tr			
						7060-7120'		52	Tr	48			Tr ca	W-M	M	0.7		0.4	Tr			Tr	Tr			
					80'	7120-7200'		66		34				W-M	W-M	0.5		0.3	Tr			Tr	Tr			

SSGF Well Elmore-IW3, Lith. & Mineralogy Recalc. to 60-ft Intervals

J. Hulen 02/03/05

	GRVL.	SS	CHT/SS	MDS & SHS.	NOD. PNT	GG & VBX	VOLTS	CA/MDS	CA/SS	EP	AC	PY	HM	SP/GN	CPY	CV	CMT
0-496'		NO SAMPLE															(4)
496-560'	0.5	1.5		98	Tr												
560-620'				100				VS	VS								
620-680'				100	Tr			VS	VS								
680-740'		30 VFG		70	Tr			VS	VS								
740-800		35 VFG		65				VS	VS								
800-860'		73 VFG		217	Tr			VS	VS								
860-920'		(S) 67 MG		33				VS	M								
920-980'		(S) 64 MG		36				VS	M-S							(CV)?	
980-1040'		(S) 40		60				VS	VS							(CV)	
1040-1100'		55		45				VS	VS								
1100-1160'		5		95				VS	VS			(0.3)					
1160-1220'		8		92				VS	VS								
1220-1280'		5		95				VS	VS								
1280-1340'		19		81	Tr			VS	VS								
1340-1400'		30		70	Tr			VS	VS								
1400-1460'		58		41	1			VS	VS								
1460-1520'		40		59	1			VS	VS								
1520-1580'		4		95	1			VS	VS			(Tr)					
1580-1640		6.5		93	0.5			VS	VS								
1640-1700'		14.5		84	1.5			VS	VS								
1700-1760'		8		89	3			VS	VS								
1760-1820'				100?				VS	(NO SS)							(CV)	
1820-1880'		58		42				VS	VS							(CV)	
1880-1940	(R)	29		71				VS	VS			Tr				(CV)	
1940-2000'		30		70				VS	VS			1.3			0.1	(CV)	35
2000-2060		71		29				S	M-S			1.3			0.2		
2060-2090'	Mixed 1	56		41				M-S	M			1.9			0.1		
2090-2150'		37		63				M-S	M			0.7					
2150-2210'		47		53				M-S	W-M			0.3		(Tr)			

Well Elmore-3, Lithology & Mineralogy Recalc. to 60-ft Intervals

JH 02/04/05

	GRVL	SS chl/SS	MDS & (SLTS)	NOD ANH	GG & MBX	CB/MDS	CB/SS	EP	AC	PY	HM	SP/GN	CPY		(CV)		CMT
2210-2270'		(S) 66	34			M-S	W-M			0.3							
2270-2330'		46	54			M	M-S			1		(0.1)	0.1				
2330-2390'		46/Tr	54			M	M-S			0.2							
2390-2450'		53	47			M	M-S			0.2							
2450-2510'		69	31			M	M-S			0.4							
2510-2570'		73	27			M-S	S			0.3							
2570-2630'	◊	61	39			S	S	(Tr)		0.3							
2630-26[illegible]0'		57	43			M-S	S			0.3							
2690-2750'		39	61			M	S			0.2							
2750-2810'		57	43			M	S			0.5							
2810-2870'		69	31			M	S			0.7					(CV)		
2870-2930'		48	17			M	S			0.2							35
2930-2990'		88	6			M	S			0.1							6
2990-3050'		73	12			M	S	(Tr)		0.1							15
3050-3110'		66	20			M-S	S			Tr							14
3110-3170'		44	42			M-S	S			Tr							14
3170-3230'		72	28			S	S			0.2							20
3230-3290'		35/VW	60			M	S			0.1							5
3290-3350'		30/VW	62			S	S			Tr							8
3350-3410' (R)		48/VW	52			M-S	S			Tr							
3410-3470'		35/VW	65			M-S	S			Tr							
3470-3530' (R)		33/VW	67			M	M-S										
3530-3590' (R)		(S) 46	53			M	M										
3590-3650' (R)		43/VW	57			M	M										
3650-3710' (R)		82	19			M	M										
3710-3770' (R)		(S) 46	54			M	M										
3770-3830' (R)		53	47			M	M										
3830-3890'		43	57			M-S	M-S			0.1							
3890-3950'		63	37			M-S	M-S								(CV)		
3950-4010'		40/Tr	60			M	S			0.1							

Well Elmore-IW3, Lithology & Mineralogy
Recalc. to 60-ft Intervals

J. Hyler
02/04/05

	GRVL	SD	CHT/SD	MDS & (silts)	NOD PUMI	GG/OBX	VN	CBY/MDS	CBY/SD	EP	AC	PY	HM	SP	GN	CBY	CV
4010-4070'		(S)	72	28				M	M								
4070-4130'			85	15				M	W-M								
4130-4190'			79	21				W-M	W-M								
4190-4250'			25	75				W	W-M					(Tr)			
4250-4310'			18	82				W-M	W-M			(0.2)					
4310-4370'			62	38				W-M	W-M								
4370-4430'	1/		35	65		(Tr)		W-M	M-S								(CV)
4430-4490'			32/VW	68				M	M-S								
4490-4550'			33/VW	67				M	M-S								
4550-4610'			25/VW	75				M	M-S			Tr					
4610-4670'			24/VW	76				M	S			Tr					
4670-4740'		NO SAMPLE															
4740-4800'			11/VW	86	(3)			M	S			0.1					
4800-4860'	(R)		36/VW	63.5	0.5			W-M	M-S			0.1					
4860-4920'	(R)		34/VW	65	1			W-M	M-S			Tr					
4920-4980'			32/VW	66.5	1.5			M	S			Tr				(Tr)	
4980-5030'			32/VW	67	1			M	S								
5030-5090'			48/VW	51.5	0.5			M	S			Tr					
5090-5150'	(R)		57/Tr	42.5	0.5			W-M	M-S			0.1					
5150-5210'	(R)		50/Tr	50				W-M	M-S								
5210-5270'			58/VW	42				W-M	M-S			0.3				Tr	
5270-5330'			74/Tr	26				W-M	M-S			0.3				Tr	
5330-5390'	◇		60/W	33.5	0.5		(3)	W-M	W			1.5		(0.2)		(0.2)	
5390-5450'	◇		46.5/Tr	51	1		1.5	W-M	W			1		0.4		0.2	
5450-5510'			38.5/VW	61	Tr		0.5	W	W-M			0.3		0.1		Tr	
5510-5570'	VA		32.5/VW	67		(Tr)	0.5	W	W-M			1		0.1		0.2	
5570-5630'	VA		14/W	30		0.5	0.5	W	W-M			0.3					35 RHY TUFF
5630-5690'	VA		8/VW	72			Tr	W-M	W			0.1					20 TUFF
5690-5750'			13/Tr	84.5			0.5	W-M	M-S			0.1				Tr	2 TUFF
5750-5810'			17	82.5			0.5	W-M	S			0.2					

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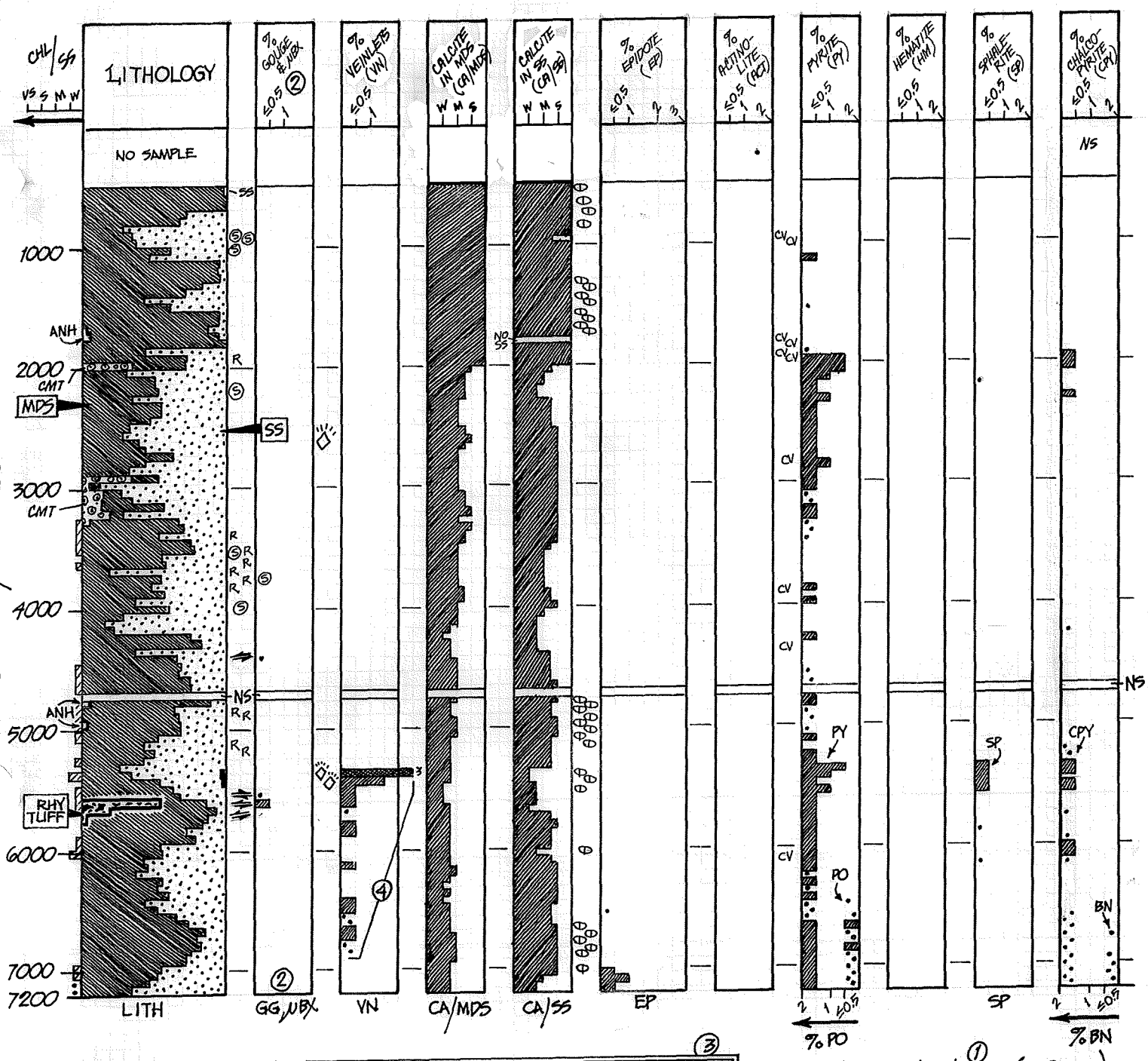
WELL ELMORE IW-3, Lith. & Mineralogy
Recalc. to 60-ft Intervals

	GRVL	SS / CH/SS	MDS & SITS	NOD RNT	GG & JBK	VNLTS	CB/MDS	CB/SS	EP	AC	PY/PO	HM	SP/GN	CPY/BN	(CV)
5810-5870		29	71				W-M	M-S			0.1				
5870-5930		21 / VW	79				W-M	M-S			0.2		Tr		
5930-5990		46 / VW	54				W-M	M-S			0.3			Tr	
5990-6050		45 / W	55	Tr			W-M	W-M			0.3			0.1	
(50-ft) 6050-6100		57	43				W-M	M-S			0.3			0.1	(CV)
6100-6160		55	44.5			0.5 ca	W-M	S			0.2		Tr	Tr	
6160-6220		62	38				M	S			0.1				
6220-6280		44	56				W-M	S			Tr				
6280-6340		48	52				W	S			0.1				
6340-6400		40	60				W-M	S			Tr				
6400-6460		56.5	43			0.5 ca	W	S			0.1			Tr	
6460-6520		47	52.5			0.5 ca	W-M	M-S			Tr / Tr			Tr	
6520-6580		35	65			Tr ca	W-M	M-S	Tr		Tr				
6580-6640		26	74			Tr ca	W-M	M-S			Tr / Tr			Tr	
6640-6700		13	86	0.5		0.5 ca	W-M	S			0.5 / 0.4			Tr	
6700-6760		20	79	0.5		0.5 ca	M	S			0.6 / Tr			Tr	
6760-6820		17	82	1		Tr ca	M	S			0.4 / Tr			Tr / Tr	
6820-6880		23	76.5	0.5		Tr ca	M	S			0.4 / 0.2			Tr	
6880-6940		28	71.5	0.5			M	S			0.4			Tr	
6940-7000		46 / VW	54				W-M	S			0.4 / Tr			Tr / Tr	
7000-7060	47	VW	53	Tr			W-M	S	0.3		0.6 / Tr			Tr / Tr	
7060-7120		52 / Tr	48			Tr ca	W-M	M	0.7		0.4 / Tr			Tr / Tr	
7120-7200	66		34				W-M	W-M		0.5	0.3 / Tr			Tr / Tr	



WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG ③

J. Hulen, 02/05/05 ① (DRAFT)

Symbols

- SLICKENSIDES
- ◇ - EUHEDRAL HYDROTHERMAL CRYSTALS
- ⑤ — LOOSE SAND IN PART
- R - "REDBEDS" IN PART
- ⌀ — ANHYDRITE NODULES
- % - PER CENT (VOLUME)
- ≤ — LESS THAN OR EQUAL TO
- > - GREATER THAN
- ′ — FEET
- ″ — INCHES
- • - TRACE
- ● (CV) - EXTENSIVE CAVING. OBVIOUS CAVED CUTTINGS OMITTED FROM ANALYSIS

Abbreviations

ANH - ANHYDRITE
cm - CENTIMETERS
CMT - CEMENT
ft - FEET
GG - GOUGE
UBX - MICROBRECCIA
MDS - MUDSTONE & ARGILLACEOUS SLTS, UNDIVIDED. MDS/SLTS TYPICALLY >5/1
NS - NO SAMPLE
PO - PYRRHOTITE
RHY - RHYOLITE
S - STRONG
SS - SANDSTONE
VN - VEINLETS
VS - VERY STRONG
W - WEAK
● m - METERS
● M - MODERATE
● CHL/SS - CHLORITIZATION OF SANDSTONE
● BN - BORNITE

→ (FOR ADDITIONAL ABBREVIATIONS PLEASE REFER TO COLUMN HEADERS)

Notes

① CUTTINGS LOGGED 08/18 - 08/8/04

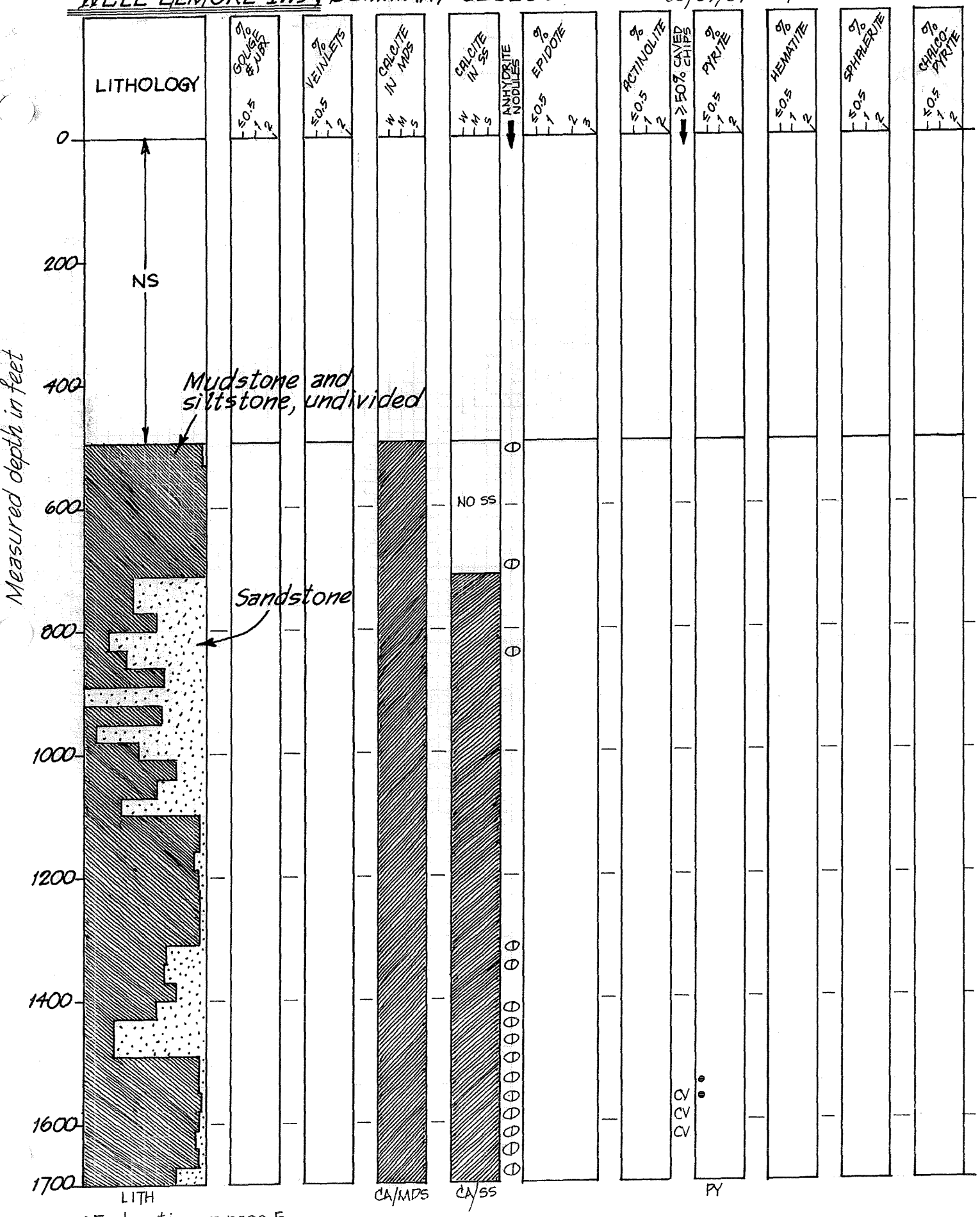
② READILY DISTINGUISHED FROM "DRILLING - PRODUCED" PIT GOUGE"

③ COMPOSITE - SAMPLE INTERVAL FOR THIS LOG 60' (18.3 m)

④ VEINLETS DOMINATED BY CALCITE; ALSO CONTAIN ANHYDRITE, PYRITE, PYRRHOTITE, AND CHALCOPYRITE IN VARIOUS COMBINATIONS.

Vertical Scale 1:14,400
(1 cm = 144 m; 1" = 1200 ft)

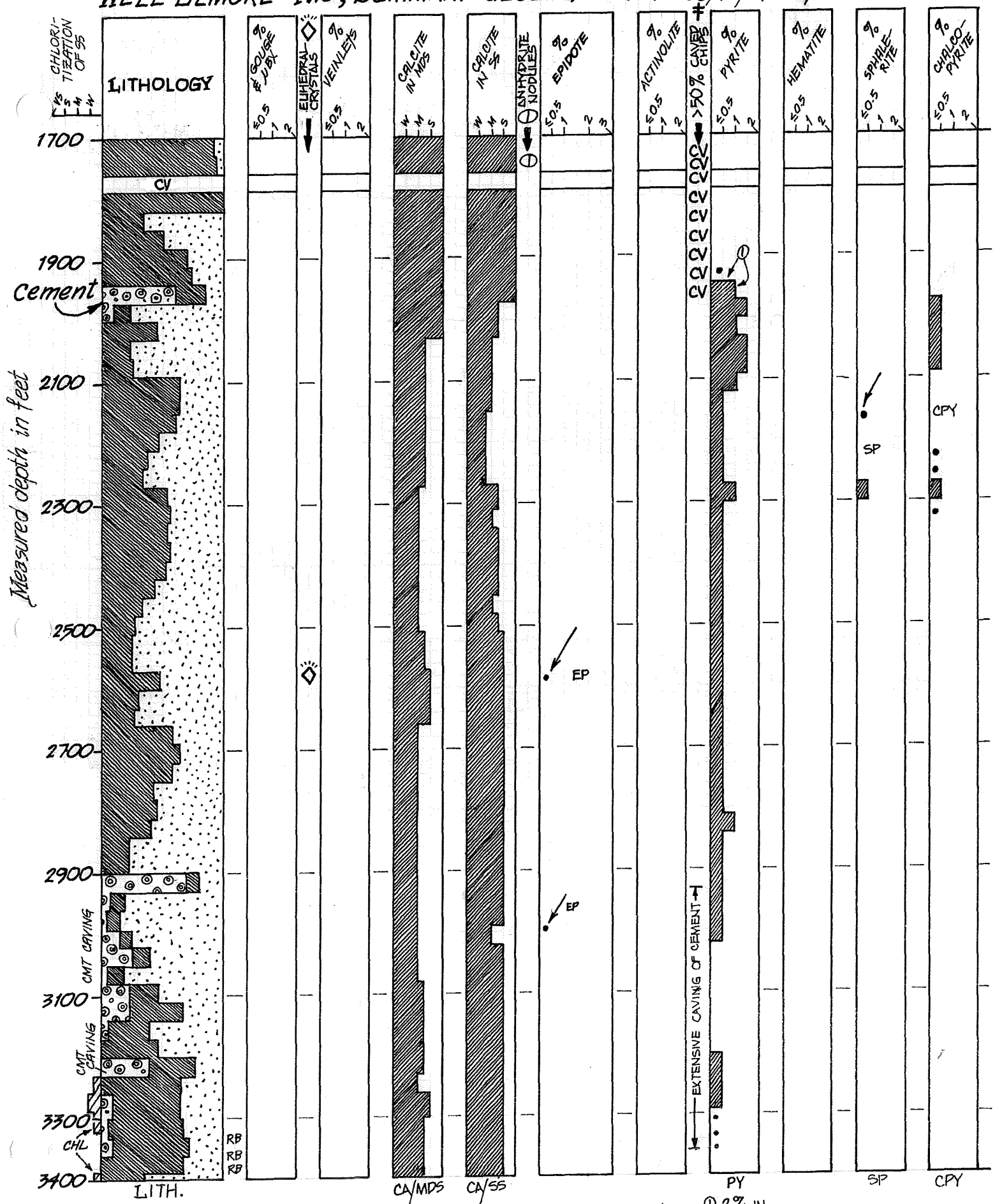
*WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG



*Explanation on page 5

*WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG

DRAFT



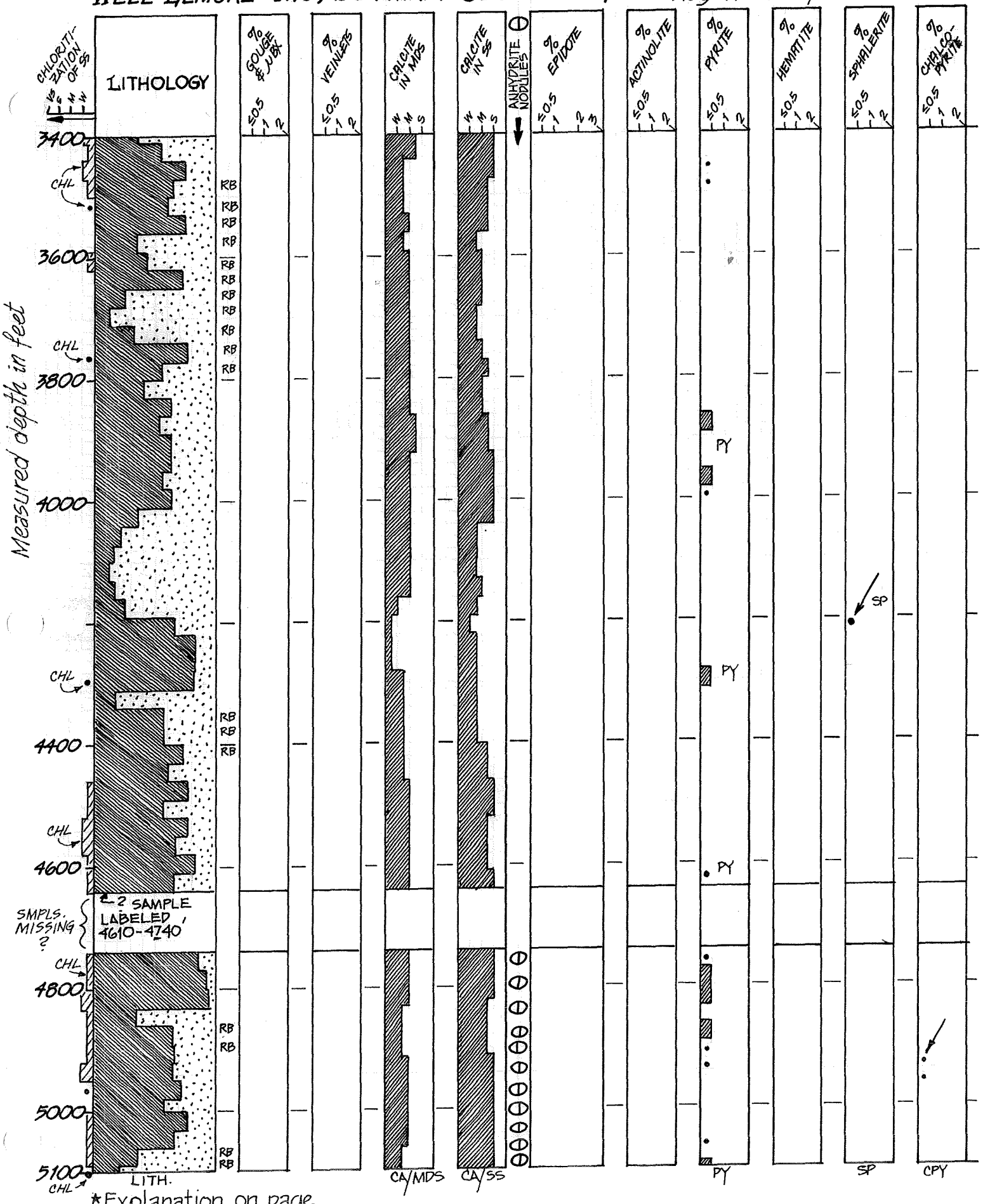
* Explanation on page

‡ Obvious caved chips excluded from analysis and interpretation

① 2% IN INDIGENOUS ROCK

*WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG

J. Hulen Aug. 11 '04 Page 3 of DRAFT

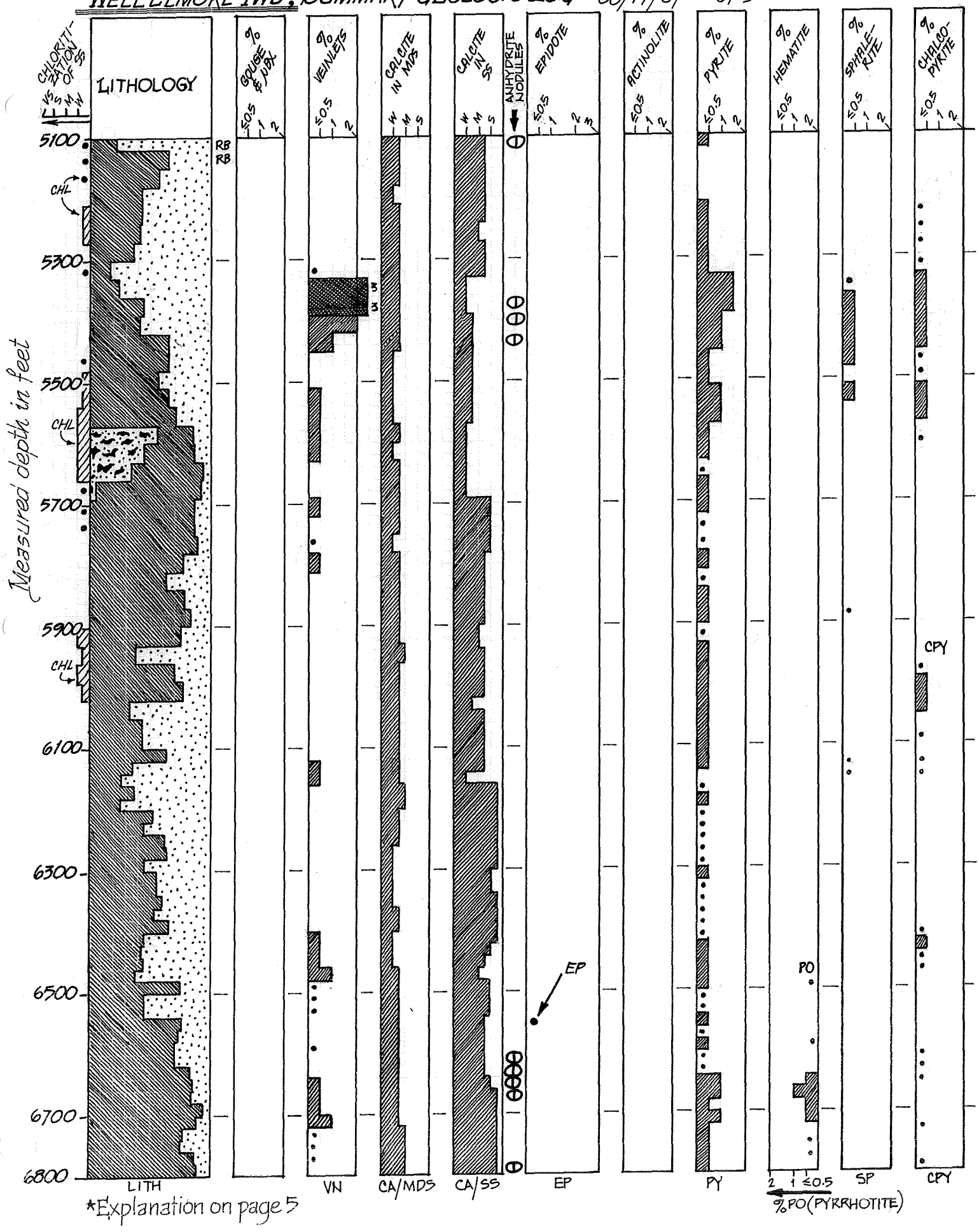


*Explanation on page

RB = "Redbeds" in part; sediments stained grayish-red with earthy diagenetic hematite

DRAFT

*WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG



*Explanation on page 5

WELL ELMORE-IW3, SUMMARY GEOLOGIC LOG

J. Hulen 08/18/04

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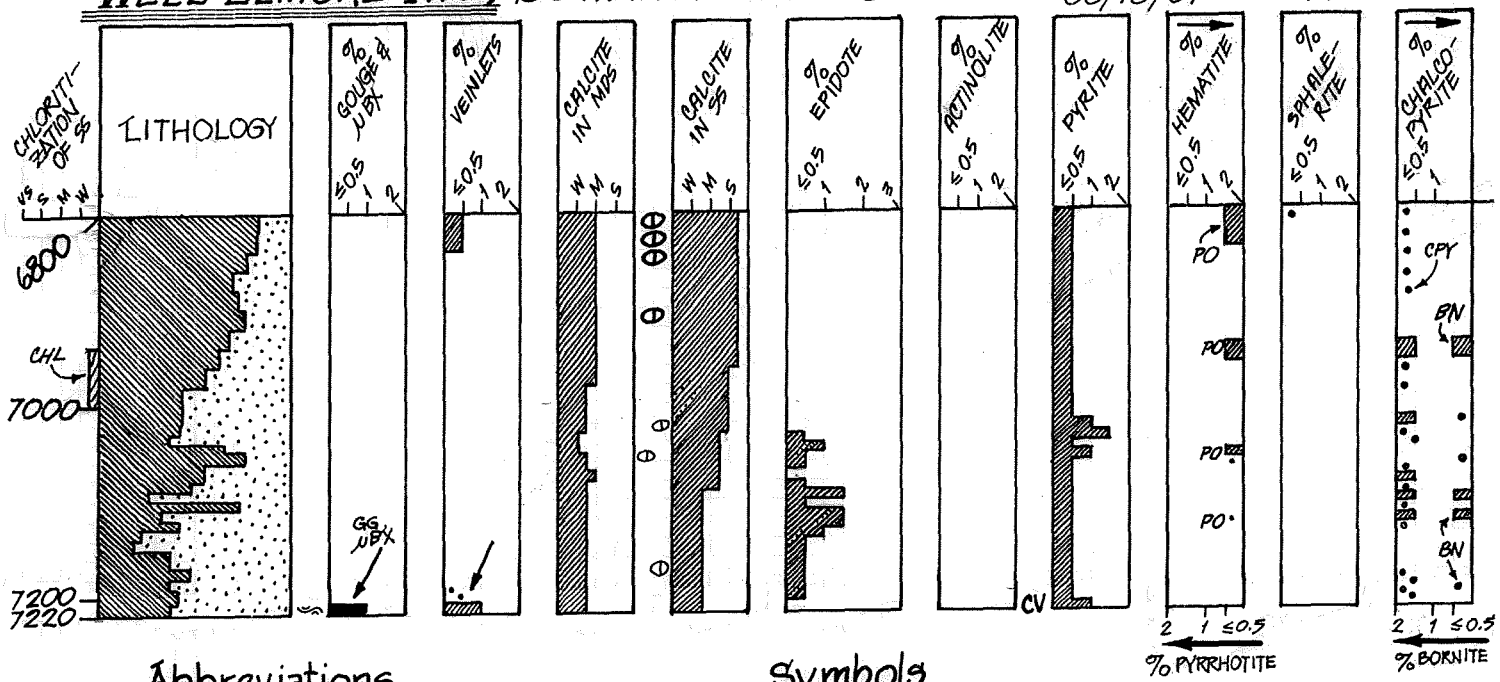


Abbreviations

AC, ACT - Actinolite
AN, ANH - Anhydrite
BN - Bornite
CA - Calcite
CHL - Chloritization (of sandstone)
CMT - Cement
CPY - Chalcopyrite
CRS - Coarse
CV - Caving, sloughing
DBX - Dilational microbreccia
EP - Epidote
FGR - Fine-grained
GG - Gouge
GR - [-]grained
HM - Hematite
LCM - Lost-circulation material
LITH - Lithology
MDS - Mudstone
M - Moderate [or] medium (depending on context)
μDBS - MICRODIABASE
μBX - MICROBRECCIA
μXLN - Microcrystalline
NS - No sample
NR - No returns
PO - Pyrrhotite
PY - Pyrite
S - Strong
SP - Sphalerite
SS - Sandstone
VN - Veinlets
VS - Very strong
VF - Very fine
W - Weak
W/ - With

Symbols

- Euhedral crystals
- Slickensides
- % - Per cent (volume)
- Anhydrite nodules
- Gastropod fossils
- Ostracod fossils
- Trace
- Lost-circulation material
- Sheared

Patterns

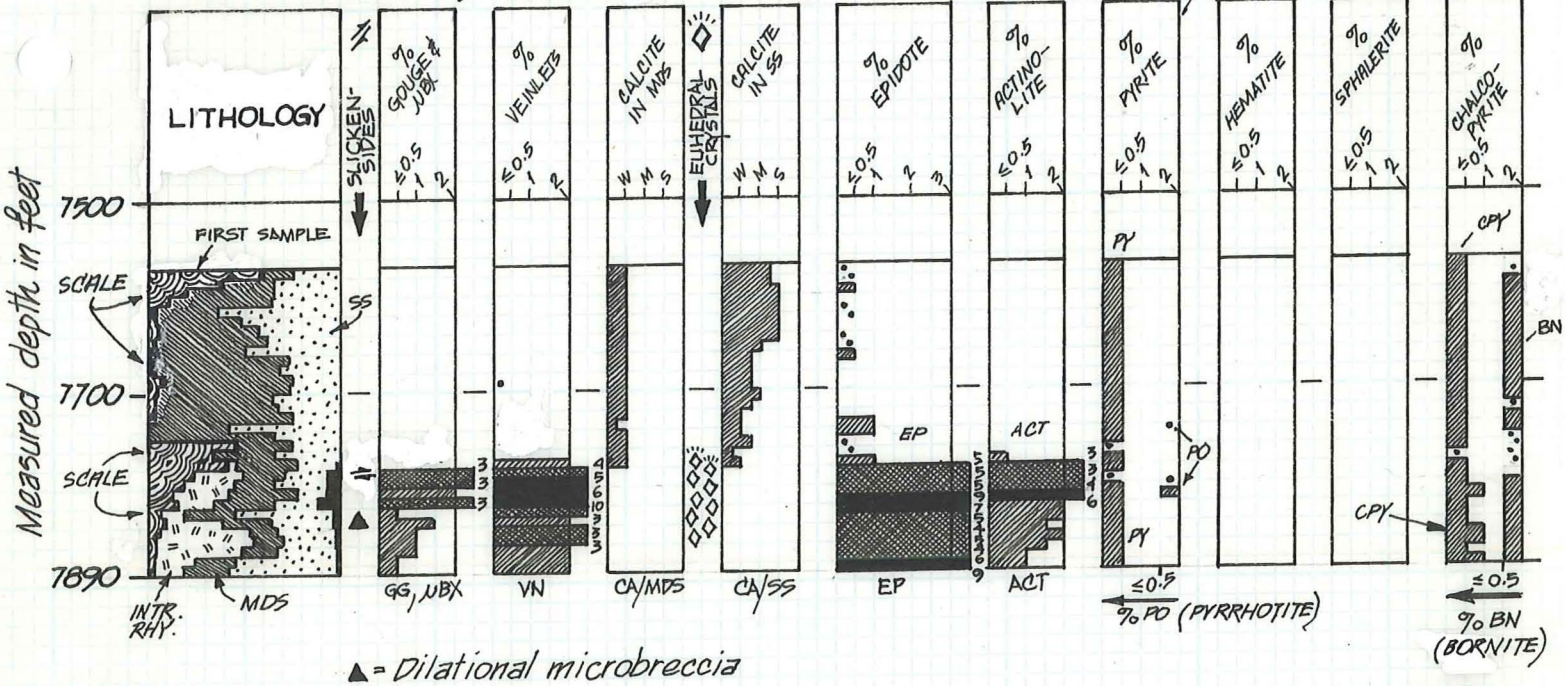
Sandstone; mostly lithic arkose to subarkose; entirely very fine- to fine-grained; moderately to well-sorted; ubiquitous diagenetic calcite cement.

Mudstone and muddy siltstone, undivided; mds:slts. ratio typically >3:1; fluvial and lacustrine origin.

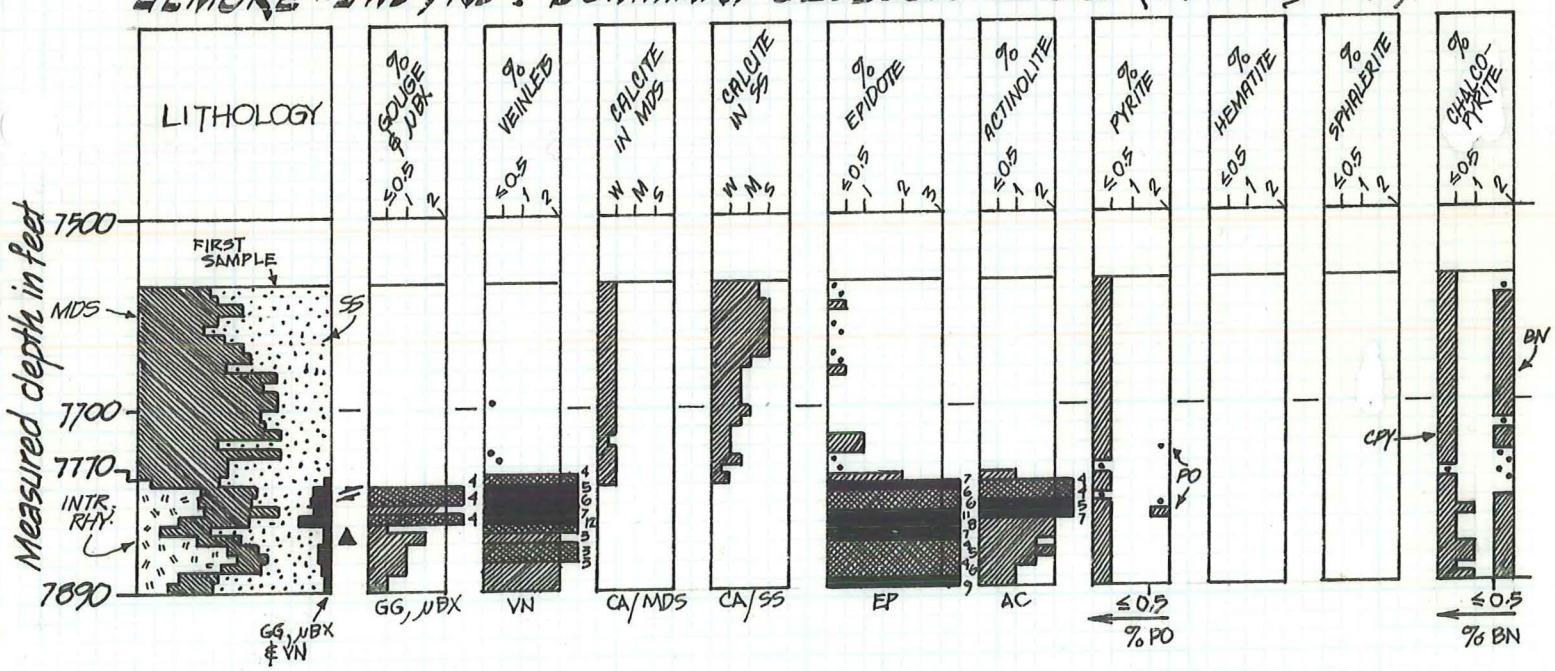
Sandy rhyolite tuff; sand, pumice, and μxln "felsite" clasts and shards in a porcellaneous, lithified, fine-ash matrix.

Borehole cement

** WELL ELMORE-IW3, REDRILL#: SUMMARY GEOLOGIC LOG I (w/scale deposits)



** ELMORE-IW3, RD#: SUMMARY GEOLOGIC LOG II (excluding scale)



NOTE: THE INTERVAL 7770-7890 IS INTERPRETED AS A FAULT/FRACTURE ZONE INTRUDED BY ONE OR MORE MICROCRYSTALLINE RHYOLITE DIKES. POROSITY & PERMEABILITY IN THE DIKES HAVE BEEN ENHANCED BY NATURAL HYDRAULIC FRACTURING. THE DIKES, HOST ROCKS, GOUGE, & MICROBRECCIA HAVE BEEN HYDRO-THERMALLY SILICIFIED, & CALC-SILICATE-ALTERED & WEAKLY SULFIDIZED, AS WELL AS EXTENSIVELY VEINED WITH VARIOUS COMBINATIONS OF THE MINERALS QUARTZ, EPIDOTE, ACTINOLITE, PYRITE, CHALCOPYRITE, AND BORNITE.

** explanation on page 2

or deepening: drilled 07/05/97-07/07/97: depth interval 7572-7889'.

(DRAFT)
J. Hulen 09/12/04

SUMMARY GEOLOGIC LOG FOR ELMORE-IW3, RD*: EXPLANATION

LITHOLOGIES AND CONTAMINANTS

Geothermal scale deposits; multiple textural and mineralogic types; at minimum, as follows:

① Laminated silica, dominantly opaque to translucent white to light gray w/minor pale to deep orange-brown. A few interlaminae of dark orange-brown amorphous iron silicate. Probable trace to minor gray colloidal sulfides (± arsenides/antimonides).

② Microgranular silica, massive to crudely laminated, mostly pale dull orange to buff, but also bone white; "micro-saccharoidal"

③ Silica-sulfide (± arsenides, antimonides). Aggregates of opaque bone white, gray, dull orange, or buff microcrystalline silica (same as "2" above) intergrown with dull, medium to dark gray submetallic grains and grain aggregates. The grains are subequant and typically 20-100 μ in diameter; aggregates are irregular to crudely arborescent and up to 0.5 mm in major-axis length. With few exceptions, sulfide : silica ≤ 1:1

④ Sulfide (± arsenide/antimonides), mostly matte medium to dark gray; commonly tarnished to "peacock" hues. Overall microcrystalline, but with a few euhedral grains up to at least 0.2 mm dia. rare powdery green oxidation. Includes traces of chalcopyrite. In part transitional to type 3 (see above).

⑤ Bladed calcite. Loose, porous aggregates of randomly-oriented to subparallel scales and blades typically 0.3-1 mm in width. The carbonate is typically transparent to translucent light gray, and commonly intergrown with type 4 (see above) metallic phases.

⑥ Blocky calcite. Transparent, colorless ("water-clear"), euhedral crystals and crystal aggregates up to 1.5 mm. in diameter. Commonly encapsulating and/or encrusted by metallic phases of type 4 (see above).

⑦ Hybrid and other scales. Various combinations of all the above scale types, and other scales that do not fit readily into any of the described major categories.

Sandstone, very fine- to fine-grained; moderately- to well-sorted; lithic arkose to subarkose. Matrix sericite-calcite above 7780'; calc-silicate/quartz below that depth.

Lacustrine and fluvial mudstone and muddy siltstone, undivided. Mudstone : siltstone typically >3:1.

Intrusive rhyolite, opaque to translucent, pinkish-white to very light pinkish-gray, commonly tinged with gray green. Massive, microgranular, aphyric, "flinty" aspect. Superficially resembles silicified mudstone.

Gouge, microbreccia and veinlets, undivided.

SYMBOLS

- Euhedral crystals
- Slickensides
- % Per cent (volume)
- • Trace
- ▲ Dilational microbreccia
- ≤ Less than or equal to

ABBREVIATIONS

AC, ACT – ACTINOLITE
BN – BORNITE
CA – CALCITE
CA/MDS – CALCITE IN MUDSTONE
CA/SS – CALCITE IN SANDSTONE
CPY – CHALCOPYRITE
EP – EPIDOTE
GG – GOUGE
INTR – INTRUSIVE
μBX – MICROBRECCIA
M – MODERATE
MDS – MUDSTONE
PO – PYRRHOTITE
PY – PYRITE
RHY – RHYOLITE
S – STRONG
SS – SANDSTONE
VN – VEIN
W – WEAK
W/ – WITH

* or deepening: drilled 07/05-07/07/97: depth interval 7572-7889'

(DRAFT)
J. Hulen, 09/12/04

Logging Notes

Elmore IW-3

08/08/04
J. Hulen

496-530'

(3) cement ?
v.v. lt. gray
v. soft, "fluffy"
resembles
white, argill.,
altd. slts.

(97) mds
lt. grsh-
orange,
semi-
consol.,
earthy
to waxy
©

(2) muddy
fgr. ss
semi-
cons.
lt. grsh-
orange
©

(1) pbbls
rounded
poss. intro-
duced w/
borehole
cement

(Tr) nod.
anh.

ovoid, <0.5
mm major
is soft,
white, 5x1n

→ contains 3-4% diss. "lignite",
black, resinous chunks
0.1-1 mm. dia. — poss. (prob?)
LCM

530-560'

(5) CMT,
including
the white
material
above &
a pebbly
cal careous,
muddy
variety

Lignite
LCM or
additive

(100%) mds.,
silty in
part, lt.
grsh-orng.
aa
©

→ plastic, only
weakly consol.,
has been
thoroughly, while
wet, disaggrega-
ted by the drilling
process, then
recombined &
dried to form
an artificial
"mds bx"

560–590'

(100) slty mds & muddy slts, undivided, semi-consol., artificial "mds bx"; lt. grysh-orng; earthy to waxy

[1] CMT
[3] LIGNITE

590–620'

(70) muddy slts, v. lt orng-gray, earthy, semi-consol., minor vfg sand

(30) mds, aa grsh-orng

620–650'

(100) slty mds & muddy slts, aa, lt. grsh.-orange to orange-gray, semi-consolidated; earthy to waxy; slts. verging on vfg. ss

---

650–680'

(100) muddy slts, aa, lt. orng.-gray

680–710'

(Tr) nod. anh.

(80) muddy, sparsely sandy (vfg) slts, aa lt. orng.-gray, semi-consol.

(20) mds, aa grayish-brnsh. orange

Logging Notes

ELMORE IW-3

J. Hulen
August 8, 2004

710-740'

↳ (40) slty mds & muddy slts. undivided; lt grayish-orng. to orng.-gray; semi-consol., mostly earthy ©

↳ (60) muddy slty ss, lt. orng. gray, semi-consol., earthy © — vfg

---

740-770'

—— all as above ——
mds, slts, & ss have been drilling-disaggregated while wet & plastic, then recombined & dried to form an artificial "breccia" —— ∴ difficult to estimate accurately relative lith percentages.

770-800'

↳ (60) slty mds & muddy slts. undivided, aa lt. grsh-orng to orng-gray ©

↳ (40) muddy slty ss aa ©

difficult to distinguish reliably; semi-consol. "artificial bx" w/ mds & slts. chips commonly coated w/ sand grains

800-830'

(20) slty mds & muddy slts, undivided. Lt grysh-orng. to orng-gray crumbly - uh- to semi-consolidated ©

(80) muddy, slty ss, vfg, lt. orng.-gray, semi-consol/friable/crumbly ©

830-860'

(Tr) nod anh <0.3mm

(35) slts/mds aa; semi-consol., color mostly lt. orng-gray to lt. grysh-orng; minor lt. yel-gray & lt. brnsh-grdy ©

(65) muddy, silty ss, aa, lt. orng.-gray ©

860-890'

(65) slts/mds, aa, but some chips lt. reddish-gray, & some lt. yellowish-gray still semi-consolidated ©

(35) muddy, slty ss, aa, exc. many chips → ss is poorly-sorted, w/ grains up to 0.5 mm. Still fgr overall ©

Logging Notes

ELMORE IW-3

J. Hulen
August 8, 200

890-920'

BIG CHANGE

100% SAND mgr, moderately- to well-sorted, translucent, v. lt. gray-buff overall; grains mostly subangular to subrounded — many appear frosted. Dominantly quartz; lesser feldspar & lithic clasts.

© (weak)

920-950'

CAVING POSSIBLE

(63) muddy slts, lt., sl. yellowish-gray, wkly. consolidated

©

(30) ss fgr-mgr v. lt. gray-buff, dom. friable, but a few ~~grains~~ chips hard & calcite-cemented

© (v. strong)

(7) SAND aa mgr w/rare crs. sand grains

©

950-980'

CAVING POSSIBLE

(10) muddy slts, aa

©

5

(45) ss u15 fgr, rel. well-cmtd. (cal) & hard

©

u30 mgr poorly-consol., source of discrete sand grains

(45) SAND aa mgr

©

980-
1010'

(15) silty mds, lt. grysh-orng & lt. yell.-gray ©

(30) muddy sparsely sandy (vfg) coarse slts, v. lt. yellowish-gray ©

(55) ss & SAND, mgr; ss is friable, crumbly; both v. lt. grayish-orng to gray buff ©

1010-
1040'

some caving likely

(75) mds & slts, undivided aa ©

(25) ss, fgr ranging from crumbly to firmly indurated ©

Tr. PY

1040-
1070'

(60) mds & slts, undivided, aa ©

(40) muddy silty ss vvfg [barely coarser than silt v. lt., sl. brnsh to sl. yel.-gray; weakly consolidated ©

1070-
1100'

(30) mds & slts, undivided, aa ©

(70) muddy, silty ss aa vvfg ©

Logging Notes ELMORE IW-3

J. Hulen
Aug. 8, 2004

1100-1130'

7 CVD (gr-orng mds)

(95) silty mds & muddy slts. undivided, lt. yel.-gray, earthy to waxy, wkly-mod. consol. ©

(5) muddy fgr silty ss lt. yel.-gray crumbly ©

1130-1160'

— all same aa —

0.5 py cmt in ss

1160-1190'

Chips "glued together" in large clumps

(90) silty mds. & muddy slts., aa, lt. yell.-gray, minor med. sl. grayish rel. bright orange ©

(10) muddy sandstone wkly consol., lt. yel. gray ©

1190-1220'

Chips "glued together" aa

(95) silty mds & muddy slts. undivided; pale reddish-gray & lt. yell-gray; wkly-vs emi-consol., aa

(5) muddy ss aa, vfg

disagg. by the drilling process (while wet), re-constituted and dried as artificial "mudstone bx"

1220–1250'

(95) silty mds & muddy slts. aa, plastic (when wet) wkly consol. mostly pale, sl. reddish-gray, minor yell.-gray, & lt. grish-orange

(5) muddy ss, vfg aa

[3] CMT (w/ minor coarse sand)

1250–1280'

— all aa —

1280–1310'

— all aa —

1310–1340

Tr mod anh.

[11] Lignite coaly, resinous to vitreous black chunks <1 mm subequant

CHANGE

(67) silty mds and muddy slts., aa semi- to weakly consol.

(33) ss, fgr, v. lt. orng-gray, translucent, wkly consol.,

1340–1370

(1) mod anh

[7] Lignite aa

(64) mds & slts., aa

(35) ss, vfg–fg otherwise same aa

Logging Notes

ELMORE IW-3

J. Hulen
Aug. 8, 2004

1370–1400'

[7] Lignite

~(75) slty mds. & muddy s/ts., undivided; mostly v. lt. grayish-red to grayish-orange; minor lt. yellowish-gray; semi- to weakly consol., plastic when wet ©

~(25) ss, fgr w/ sparse med.–crs. grains, v. lt. gray-buff to orange-gray overall mostly translucent. comm. muddy, wkly consolidated. ©

1400–1430'

(1) nod anh "warty ovoids" ≤4 mm

~(59) mds & s/ts aa ©

~(40) ss aa ©

1430–1460'

~[20] caved

(1) nod anh [in ss]

(24) mds & s/ts aa ©

(75) ss, fgr aa ©

1460–1490'

(2) nod anh

(23) mds. & s/ts. aa ©

(75) ss, fgr aa ©

1490–1520

[2] Lignite
aa
[Tr.] R&S

Tr. nod anh

(95) mds & muddy s/fst. undivided mixture of lt. reddish-gray & lt. yellowish-gray, wkly consolidated, earthy ©

(5) ss vfg-fg wkly consol. lt. grayish-buff ©

1520–1550'

(8) Lignite

(1) nod. anh.

——all else——
aa

[Tr. py]

1550–1580

[60] CVD
[7] Lignite in non-caved fraction

(1) nod anh
incl. 0.5mm "desert rose" aggregate

(97) mds + s/ts, aa ©

(2) ss aa ©

[Tr. py, in "desert rose"]

1580–1610'

[50] caved
[5] lignite

(1) nod anh

(96) mds + s/ts, aa ©

(3) ss aa ©

Logging Notes

Elmore 1W-3

August 8, 2004
J. Hulen

1610-1640'	Tr. mod anh ⊕	(91) mds & muddy slts. aa, wkly-mod. consolidated. Mostly matte lt., sl.-yell.-gray; minor lt./reddish-gray ©	(9) ss, vfg-fg, v. lt. gray-buff © wkly. consol.	
50 CAVED				
1640-1670'	(Tr) mod anh ⊕	(93) mds + slts, aa ©	(7) ss aa vfg ©	
55 CAVED				
1670-1700	(3) mod anh 0.1-3 mm white opaque 5%lm	(74) mds + slts, aa ©	(23) ss vfg aa ©	
30 CAVED				
1700-1730	(2) mod anh ⊕	(89) mds + slts, aa ©	(9) ss, vfg aa ©	
65 CAVED				
1730-1760'	(3) mod anh ⊕	(90) mds + slts., aa mixture of [matte] lt. reddish-gray & lt. yellowish-gray ©	(7) ss, vfg aa, ©	
30 CAVED		11		

1760-1790'

probably >75 CAVED poor sample

—DO NOT USE—

incompletely washed

1790-1820'

? CVD

? 100% mds + slts aa ©

1820-1850'

>50 CVD

(33) mds; dom. matte, flat, lt. yel.-gray ©

(67) ss, vfg, argillaceous ("muddy"), mostly v. lt. gray buff, crumbly/friable ©

1850-1880

>75 CVD

(50) ? mds. aa ©

(50) ? ss aa ©

incomplete wash somewhat unreliable sample

1880-1910

>75 CVD

2 LCM

(70) ? mds aa ©

(30) ? ss aa ©

incomplete wash, somewhat unreliable sample.

Logging Notes | ELMORE IW-3 | J. Hulen 08/08/04

1910-1940'

>80 CAVED

(78) mds, & muddy s/ts, undivided; mostly matte lt. sl. yel.-gray, minor matte lt. reddish-gray ©

(27) ss, vfg, v. lt. gray-buff, mod. consol., ©

Tr. py

1940-1970'

<60 CMT

<20 CVD

60 PINK-GRAY CMT

*** BIG INCREASE IN SULFIDE ****

(24) mds & s/ts aa ©

(16) ss, vfg v. lt. brnsh-gray to gray-buff aa, ©

1 py

1970-2000'

10 CMT

10 CMT (Tr) mod. anh

(13) mds & muddy s/ts, undivided. Matte lt. yel.-gray ©

(77) ss, vfg, v. lt. gray-buff to v. lt. brownish-gray. Mod.-indurated conspicuous diss sulfide in matrix of many chips. ©

1.5 py
0.1 cpy (diss)

2000-2030'

3 RDS

X (3) CMT

(35) mds. & s/ts aa ©

(65) ss, vfg aa ©

matrix pearlescent white sericite in part ⊙

1 py
0.2 cpy

13

2030-2060'

2 cmt
2 R$S

(23) mds & muddy slts. aa

(77) ss, vfg aa

matrix rich in pearlescent white sericite

1.5 py
0.2 cpy

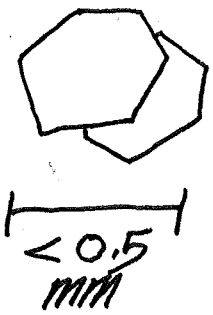
2060-2090

3 cmt
1 R$S

(25) mds & muddy slts. aa

(15) ss, vfg aa

1.5 py
0.1 cpy



← diss Fe-S commonly with this shape, but non-magnetic; possibly pyrite replacing pyrrhotite.

2090-2120'

Very small-dia. cuttings (avg. < 1 mm)

(63) mds & muddy slts., aa

(37) ss, vvfg aa

1 py

2120-2150'

— all aa —

0.3 py
[diss.]

Logging Notes

ELMORE IW-3

J. Hulen
08/10/03

2150-2180'	(7) mds, matte lt. gray earthy ©	(53) slts, argill., v. lt. matte buff-to sl. yell.-gray earthy ©	(40) ss, vfg, v. lt. gray-buff, earthy to chalky texture abund. pearlescent white sericite in matrix. ©	0.3 py Tr. sp. [all diss.]
2180-2210'	(13) mds aa ©	(34) muddy slts., aa ©	(53) ss, vfg aa ©	0.3 py
2210-2240'	(15) mds aa ©	(22) muddy slts aa ©	(63) ss, vfg-fg aa ©	0.3 py Tr. cpy
2240-2270'	(7) mds aa ©	(25) muddy slts. aa ©	(68) ss, vfg-fg aa ©; in part disaggregated into constituent grains. ©	0.2 py Tr. cpy

2270–2300'

SPHALERITE APPEARS

(9) mds aa ©

(44) muddy slts. aa ©

(47) ss vfg aa © ↑

1.5 py
0.1 sp
0.1 cpy

- all sufides interstitial/intergranular
- sp is red-orange to amber; transparent to translucent.

2300–2330'

(5) slty mds. aa ©

(50) muddy slts, aa ©

(45) ss vfg aa ©

"OATMEAL-COLORED"

0.5 py
Tr. cpy

** Here and above, abundance of SILTSTONE is uncommon for the SSGF

2330–2360'

COARSER CUTTINGS

(7) mds aa ©

(46) muddy slts, aa ©

(47) ss vfg aa
hint (trace) of chl ©

0.2 py

"OATMEAL-COLORED" & siltstone rich

NEXT PAGE

Logging Notes

ELMORE IW-3

J. Hulen 08/10/04

"OATMEAL-COLORED"

2360-2390'

(11) silty mds (44) muddy s/ts.

matte, v. lt., sl. brownish- to sl. yellowish-gray; earthy, massive. ©

(45) ss, vfg, buff-white to very light gray buff; abund. pearlescent white lx/n. sericite in matrix. some chips w/ faint greenish tinge (incipient chloritization?) ©

0.2 py [diss.]

2390-2420'

"OATMEAL-COLORED" — very similar to above; still unusually siltstone-rich.

(7) silty mds. (43) muddy s/ts (48) ss, vfg. aa, ©

aa ©

0.1 py [diss.]

2420-2450'

sample contains silica spheres (~100-150μ)

(5) silty mds (38) muddy s/ts

aa ©

(57) ss, vfg aa, ©

0.2 py [diss.]

"OATMEAL-COLORED"

2450-2480'

(7) slty mds (26) muddy s/ts. (67) ss, vfg aa ©

aa ©
(& grayer than ss)

0.3 py [diss.]

2480-2510'

(5) slty mds (24) muddy s/ts.

aa ©

(71) ss, vfg aa ©

0.5 py [diss.]

2510-2540'

(3) slty mds (24) muddy s/ts

matte v. lt. gray to buff- & sl. yellowish gray; earthy, massive. ©

(73) ss, vfg-fg aa, but ranging in color from v. lt. gray buff through lt. grayish-pink to v. sl. greenish lt. gray (poss. incipient chloritization) ©

0.3 py

2540-2570'

— all aa —

0.2 py

Logging Notes

ELMORE IW-3

J. Hulen
Aug. 10, 2004

2570 – 2600'

9 cement
2 R#s

(7) silty mds. (41) muddy slts → earthy, matte lt., sl. brnsh to sl. yel. gray ©

(52) ss, vfg, mostly lt. gray-buff to buff-gray ©

0.2 py [diss.]

Tr. [ep]

(Tr) VVF – epidote

2600 – 2630'

cuttings stained lightly w/ brownish-black oil (2)

0.3 py [diss.]

8 lignite

(5) mds (25) slts → aa ©

(70) ss, vfg → aa ©

2630 – 2660'

still surprisingly little "pure" mudstone

0.2 py [diss.]

(3) mds (25) slts → aa ©

(72) ss, vfg → aa ©

"OATMEAL-COLORED"

2660-2690'

(15) slty mds (43) slts

earthy; matte, lt. sl. yel. to sl. brnsh. gray

(C)

(42) ss, vfg

buff-white to v. lt. gray buff; ablund. pearlescent white ser. in matrix; chalky to earthy texture.

(C)

0.3 py [diss.]

2690-2720'

(19) slty. mds aa (45) muddy slts. aa

(C)

(36) ss, vfg aa (C)

0.1 py

"OATMEAL-COLORED"

2720-2750'

u 25 CVD

(23) mds (36) slts aa (C)

(41) ss, vfg aa (C)

0.2 py

2750-2780'

B LIGNITE
u 15 CVD

(8) mds (34) slts aa (C)

(58) ss vfg aa (C)

0.4 py

2780-2810'

u 20 CVD

Many chips coated with oil

(45) mds, T slts. aa (C)

(55) ss vfg aa (C)

0.5 py

Logging Notes ELMORE IW-3 J. Hulen August 10, 2004

2810–2840

~40 mds & slts, undivided; matte, v. lt. / sl. brnish. to sl. yellowish-gray. ©

~60 ss, vfg, v. lt. gray-buff with v. sl. greenish cast (incipient chltzn?) ©

1 py / Tr. cpy

~35% CVD

3 mm major axis

1 clot of uxln. pyrite replacing vfg. ss

2840–2870'

~23 mds & slts aa ©

~77 ss, vfg, aa ©; chips have "nubbly" texture & have considerable ~~integr~~ intergranular, uxln whitish sericite

0.3 py

~30 CVD

"OATMEAL-COLORED"

2870–2900'

—all aa—

0.2 py [conc. in clots of uxln ≤ 5]

2900–2930'

70% CEMENT slightly pinkish-white, very vesicular (ves. typically ~100 μ dia.)

3 R&S

1 Aluminum

2 Lignite

[GUESS] ?

20 ss

10 mds & slts., aa

0.1 py ?

~~29~~

2930–2960

[7] CMT
[2] R&S
[1] Lignite
[1] Aluminum

(5) mds + siltst. aa ©

(95) ss, vfg, qtz-rich, v. lt. gray-buff to gray-pink; translucent ©

0.1 py [diss.]

2960–2990

[4] CMT
[2] R&S
[1] Al
[Tr] crs muscovite
[Tr] Lignite

(7) mds & slts aa ©

(93) ss, vfg, aa ©

0.1 py

2990–3020

[15] CMT
[4] R&S
[Tr] Al
[Tr] crs. musco-vite
[Tr] 100± μ silica spheres
[Tr] Lignite

EPIDOTE RE-APPEARS

(11) mds & slts. aa ©

(89) ss, vfg, aa, but color mostly [translucent] light gray (no buff, no pink) ©

Tr. EP
0.1 py

→ 2 chips w/ diss. grnsh.–yellow epidote

these are ~~&~~ & silicified

22

Logging Notes

ELMORE IW-3

J. Hulen 08/11/04

3020–3050'

25 CMT, including flat plates up to 15X10X1mm

1 Cu-dust grease

Tr Aluminum

4 R#S

Tr Coarse muscovite

20 mds + slts, matte lt. gray to sl. brnsh.–gray ©

80 ss, vfg, v. lt. gray buff ©

Tr. Py [diss.]

"OATMEAL–COLORED"

3050–3080'

BETTER SAMPLE

3 mds aa

18 muddy slts, aa ©

84 ss, vfg aa common UX'n. matrix white ser. ©

Tr. Py

4 CMT

3 R#S

Tr Al

Tr Cu-dst grease

3080–~~3100~~ 3110'

ABUNDANT CEMENT AGAIN

31 mds + slts aa ©

69 ss, vfg, aa ©

Tr. Py

23 CMT

3 R#S

1 Cu-dst grease

Al 1

Tr Crs. musc

3110-3140

23 CMT
3 R&S
1 Al

(7) silty mds (72) muddy slts. matte, lt. gray earthy ©

(41) ss, vfg, v. lt. gray-buff ; ©

Tr. py

3140-3170'

4 CMT
2 R&S
Tr Al
Tr crs. musc.

(38) mds + slts aa ©

(62) ss, vfg-fg, aa ©

Tr. py

3170-3200'

Finally: Little or no cement

2 R&S
Tr Al

(21) silty mds (26) muddy slts. ©

(53) ss, vfg, aa ©

3230

3200-3230'

5 R&S
2 Al
1 Cu-grease

40% CMT - slightly curviplanar 1 mm-thick flakes/plates up to 23 X 15 mm

SERIOUS CEMENT-CAVING PROBLEMS

(63) ± mds + slts. aa ©

(37) ± ss, vfg aa ©

03 py [diss.]

Logging Notes

ELMORE IW-3

J. Hulen
Aug. 11, 2004

~~3220-3250'~~

(65) muddy slts. & slty. mds, matte lt., sl. brownish-gray ©

(35) ss, vfg-fg, range of colors: (1) v. lt. gray-buff; (2) v. lt. grysh-pink; (3) v. lt. grnish-gray to grysh-green ©

vw chltzn

0.1 py

3230-3260'

Tr Al

Tr CMT

↳ abund. white vxln. ser. in matrix (w/ diag. calcite)

~~3250-3280'~~

(62) mds & slts aa ©

(38) ss, vfg, aa, exc. in 7% of chips distinctly greenish. ©

W chltzn

0.1 py

3260-3290'

10 CMT

1 Al

2 R&S

3290-3320'

(65) ² mds + slts, aa ©

(35) ² ss, vfg, aa ©

vw chltzn.

Tr. py

7 CMT

3 R&S

2 LIG

1 Al

Tr Cu-grease

"REDBEDS"

3320-3350'

2 R&S
2 LIG

10 CMT; mostly one chip 21X15X 2mm — smooth // grooves one flat side

(69) mds & slts, aa, exc. u 1/10 is grayish-red ©

(31) ss, vfg aa, exc. u 10% of total is grysh-red to grysh.-pink ©

Tr. Py

3350-3380'

2 R&S

— all aa —

Tr. py

3380-3410'

(35) mds & slts aa ©

(65) ss, vfg, mottled v.lt. gray-buff, grayish-pink, & [minor] lt. gray green (chl.) ©

wk. chltzn.

3410-3440'

(55) mds & slts aa ©

(45) ss, vfg, aa, © v. wk. chltzn.

3440-3470'

2 R&S

(75) mds & slts aa ©

(25) ss, vfg, aa © wk. chltzn.

Tr. py

Logging Notes | ELMORE IW-3 | J. Hulen 08/11/04

3470–3500

3 CMT
2 R$S
2 LIG

(48) slty mds (17) muddy slts.

mottle. mostly lt., sl. brnsh to v. sl. greenish-gray; minor lt. grayish-red.

© 1

(35) ss, vfg, mod.– to well-sorted, mottled v. lt. gray-buff, v. lt. grysh-red & grysh-pink, & minor lt. grysh-grn; v. wk. chltzn.

© 1

Tr. py

red chips

"REDBEDS" in part.

3500–3530

2 LIG
2 R$S

(60) mds & slts

© 1

(40) ss, vfg, aa exc. v. little gray-green

© 1

3530–3560

(74) mds + slts aa

© 1

(26) ss, vfg, aa ©

3560–3590

5 R$S

(35) mds & slts mixture of lt., sl. grnsh-gray & lt. grayish-red

©

(17) ss vfg aa ©

"REDBEDS"

27

(48) SAND ufgr–lmgr [unusually coarse] mod.-sorted quartz-rich overall lt., transl., sl. pinkish-gray

©

3590-3620'

(43) mds + slts grayish-red & lt. gray [both colors] matte ©

(57) ss, vfg-fg [rare mgr]; v. lt. gray-buff; v. lt. grayish-pink; pinkish-white ©

REDBEDS → scattered, 50-100μ clots [intergranular] of μXln, gray-green CHLORITE

vw ch tem

3620-3650'

[3] R$S

(72) mds & slts, aa ©

REDBEDS

(28) ss, vfg, aa ©

3650-3680'

(25) mds & slts, aa ©

REDBEDS

(75) ss & SAND vfg-fr. common pinkish-white and lt. grysh.-pink. ©

3680-3710'

(12) mds & slts, aa ©

(88) SAND, fgr-mgr [same as 3560-90'] qtz-rich, well-sorted subΔ to subrnd.; en masse is translucent lt. gray buff to v. lt. grysh-pink ©

Logging Notes — ELMORE IW-3 — Aug. 11, '04 — J. Hulen

3710–3740

REDBEDS

(28) mds & slts chips a mixture of matte lt. gray & matte lt. – med. grayish-red ©

(20) ss, vfg–fgr v. lt. gray–buff pinkish white, & minor grayish-red ©

(48) SAND fgr–mgr, same as 3680–3710 ©

3740–3770

(77) [mostly] mds w/ minor muddy slts., >9/10 matte, lt gray to sl. brnsh. gray w/ 1/10 grayish-red ©

(23) ss and SAND, aa ©

REDBEDS IN PART

3770–3800

(55) mds & slts. aa ©

(45) ss, vfg, pinkish-white to v. lt. gray buff; abund. white intergranular sxln, matrix sericite ©

Tr. chlitzn

REDBEDS IN PART

3800-3830'

5 LIG
3 RES

"Dirty" sample

~(40)? mds & slts aa ©

~(60) ss vfg aa ©

3830-3860'

3 RES
4 LIG

"Dirty" AA

(68) mds & slts aa ©

(37) ss, vfg aa ©

3860-3890'

"REDBED" aspect nearly gone.

0.1 py

(52) mds & muddy slts, aa, mstly matte, v. lt-lt. sl. brnsh-gray ©

pyrite re-appears

(48) ss, vfg, buff-white to v. lt. gray buff, well-sorted. ©

3890-3920'

EXTENSIVE CAVING

(63)? mds & slts aa ©

(37)? ss, vfg, aa ©

NEXT PAGE

Logging Notes

ELMORE IW-3

Aug. 11, '04
J. Hulen

~~3920-~~ ~~3950~~

3950-3980'

~~59~~ 56 silty mds. & muddy slts, undivided; v. lt-lt. sl. brownish-gray; matte ©

~~41~~ 44 ss, vfg, buff-white to v. lt. gray-buff; abund white uxln ser. in matrix; mod. sorted ©

0.1 pyrite

3980-4010'

71 CMT flat plates up to 20X15X1 mm

63 mds & slts aa ©

37 ss, vfg, aa ©

Tr. Shltzn

Tr. Py

4010-~~4020~~ 40'

36 mds & slts aa © — very fresh-appearing

64 ss, aa, exc. vfg to fg same colors textures

"OATMEAL-COLORED"

Very Sandy

4040-4070'	(21) mds & slts, aa ©	(79) SAND & ss, VFg-fg, well-sorted, overall color v. lt. translucent grayish-pink © "CLEAN" ●●●+ mostly
4070-4100	(17) mds & slts aa ©	(83) ss, pinkish-white to v. lt. grayish-pink w/ diss, matrix "speckles" of pure white to cream-colored sericite. VFG ©
4100-4130'	(12) mds + slts aa ©	(88) ss, vfg, aa ©
4130-4160'	(17) mds & slts aa ©	(83) ss, vfg, aa ©

Logging Notes | ELMORE IW-3 | August 12 '04 J. Hullen

very fresh-appearing

4160-4190

(25) mds. + slts, matte lt. gray to sl. brownish-gray ©

(75) ss, vfg-fg, lt., sl. brownish-gray to gray-buff w/ 1-2% dkss dk. gray speckles "peppered oatmeal" appearance. ©

4190-4220'

(67) mds & slts aa ©

(33) ss, vfg-fg aa ©

Tr. sp ★ (honey yellow, trans.)

Look fresh but very little diagenetic calcite.

4220-4250'

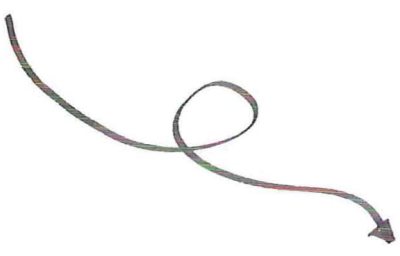
(83) mds + slts darker than above, lt.-med., sl. brownish-gray. ©

(17) ss, vfg-fg aa ©

→ poss. trace chl.

4250-4280'

—all aa—



4280-4310'

(81) mds & slts aa

(19) ss, vfg-fg aa

Tr chlt zn

0.3 py

very fresh-looking

4310-4340'

50 LIG.

(19) ? mds & slts., aa

(81) ? ss vfg-fg aa

4340-4370

9 Lig.

"REDBEDS" Re-appear [does not appear caved]

u (57) mds & slts. u 2/3 lt. grayish-red; u 1/3 lt. gray, both matte

u (43) ss, vfg-fg v. lt. gray-buff to lt. grayish-pink; rarely grayish-red.

4370-4400'

u 25 CVD

u 3 CMT

—all aa—

Logging Notes | ELMORE IW-3 | August 12, '04 T. Hulen

4400-4430

(11) Tr. in mds

(8) Lignite

(73) mds & slts Mix of lt. gray & lt. grayish-red, matte. (C)

Tr. GG

(27) ss, vfg-fg, dom. v. lt. gray-buff, minor lt. grayish-pink, pinkish-white, and grayish-red (C)

4430-4460'

(13) LIG

—Incompletely washed—

u(60)? mds & slts. aa, (C)

u(40)? ss, vfg-fg, aa (C)

4460-4490

Lignite gone

(77) mds & muddy slts, undivided. matte lt. gray to sl. brownish-gray. (C)

(23) ss, vfg-fg, v. lt. gray-buff to sl. greenish-buff V.W. chltzn (C)

4490-4520'

(56) mds + slts aa (C)

(44) ss, vfg-fg, aa, (C) V.W chltzn

35

4520-4550'

(77) MDS & muddy slts, aa ©

(23) SS, vfg-fg, © chloritizn. has increased, some chips distinctly grayish-green

wk. chltzn

4550-4580'

(67) MDS & muddy slts, aa, matte lt. gray ©

(33) SS, vfg-fg, aa ©

wk. chltzn.

4580-4610'

(12) Lignite

(83) MDS & muddy slts, aa ©

(17) SS, vfg-fg aa ©

Tr. py

v. wk. chltz.

4610-~~4640~~ 4740'

(5) MDS & muddy slts, aa ©

(35) SS, vfg-fg aa ©

v. wk. chltzn.

~~4640'~~ ~~4670'~~

Is this mis-labeling?

At any rate, next sample is 4740 to 4770'

Logging Notes | ELMORE-IW3 | J. Hulen

Very fresh-looking

Aug. 12 2004

4740-4770'

MDS & muddy s/ts., matte lt. gray to [rarely] lt., sl. greenish-gray. ©

85

(2) NOD ANH (see below)

(13) SS, vfg, lt. grayish-buff, grayish-pink & sl. grnsh-buff [variously] v. wk. chltzn. ©

Tr. py

4770-4800'

(3) NOD ANH "salmon-colored" lt grysh-orange; rel. crs. Xs. evidently repl. w/ py

(88) MDS & muddy s/ts. aa ©

(8) SS, vfg, aa; some chips w/ clots & blades of the salmon-colored anh. ©

v. wk. chltzn.

0.1 py

4800-4830'

(1) NOD ANH aa

(92) MDS & argillaceous s/ts aa ©

(7) SS, vfg, aa ©

wk. chltzn.

0.2 py

37

"REDBEDS" IN PART

4830-4860'

(35) MDS + muddy slts, mostly matte, lt. gray; minor lt. grayish-red ©

(65) SAND w/ minor ss; former is (anomalously) med.-crs. grn; * latter is vfg-fgr; v. lt. gray to buff to v. lt. grayish-red ©

→ v. wk. chltzn.

4860-4890'

(2) NOD ANH >1-2 mm vxln → grayish-org. fxln → & transl. gray ⊕

(63) MDS & ~~slty mds~~ muddy slts. aa ©

(35) ss, aa; some chips v. micaceous — muscovite flakes 5-7x avg. grain diameter ©

0.2 py bdd, vxln syng.

→ vw chltzn

"REDBEDS" in part

4890-4920

"Redbeds" in part → just ss

Tr. py syng. in mds

(67) MDS & muddy slts aa; >95% matte lt. gray ©

(33) ss, vfg-fg, buff-white to v. lt. gray buff comm. tinged w/ gray-green; tr. discrete intergranular, <xln. chl. clots <50μ dia. ©

→ vw chltzn.

Logging Notes

ELMORE 1W3

J. Hulen
Aug. 13, 2004

4920–4950'

(2) NOD ~~ANH~~ ANH, pinkish-white µxln "clean" discrete chips ~~[none observed in mds itself]~~

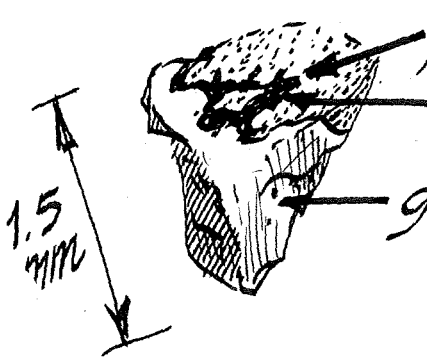
→ found 2 chips w/ pink anh. IN mds.

(63) MDS ≠ muddy slts, matte lt. gray ©

(35) SS, vfg-fg, ~~buff~~, v. lt. gray-buff to v. lt. greenish-gray ©

w/ chltzn.

Tr.-PY
Tr-cpy



→ SULFATE TO SUFIDE REDUCTION

4950–4980'

(1) NOD ANH aa

→ Tr. cpy/anh aa

(10) MDS ≠ muddy slts, aa ©

(29) SS, vfg-fg aa ©

Tr. chltzn.

Tr. cpy

4980–5010'

(Tr.) NOD ANH aa

(59) MDS ≠ muddy slts. AA ©

(41) SS, vfg-fg aa ©

** Labeling Errors? Also a sample labeled "4970-5000"

→ next is 5000-5030'

39

~~5010-5040'~~

5000-5030'

(2) NOD ANH ≤3 mm, f-mx/lh transl. lt gray

(76) MDS & muddy slts., aa exc. both matte lt. gray & matte lt. sl. grnsh-gray ©

(22) SS, vfg-fg, v. lt. gray-buff to v. lt. grnsh-gray ©

vw chltzn.

5030-5060'

~~1% CVD~~

(1) NOD. ANH. aa

(66) mds & slts. aa— some grayish-red ~~rk gy carbd.~~ ©

(33) SS aa ? [continuum w/ crs. slts.] ©

vw chltzn

Tr. PY

no

"REDBEDS" IN PART

5060-5090'

(Tr.) NOD ANH

(37) MDS & muddy slts. aa; mostly matte lt. gray to sl. grnsh-gray; minor lt. grayish-red ©

(63) SS, vfg-fg varicolored: ~1/2 lt.-med. grysh-pink to grysh-red. ~1/2 lt. gray-buff to buff-white ©

vw chltzn

Logging Notes

ELMORE IW-3

J. Hulen
August 13, '04

5090-5120'

very fresh-looking: In mineral exploration, we used to call such rock "hungry"

0.1 py
diss. in sandstone

① NOD ANH

"REDBEDS" IN PART

(21) MDS & muddy s/ts, mostly matte lt. gray—ranging to lt. reddish & sl. greenish-gray ©

(78) SS, vfg-fg mostly lt. grayish-pink w/ minor gray-buff & lt. grnish-gray ©

Tr. chltzn.

5120-5150'

"REDBEDS" in part

(5) mds & muddy s/ts, aa ©

(35) ss, vfg-fg aa ©

Tr. chltzn.

5150-5180'

(57) mds & s/ts aa ©

(43) ss, vfg-fg aa, but pink coloration diminishing

Tr. chltzn

5180-5210'

(43) mds & s/ts aa ©

41

STILL VERY FRESH

(51) ss, vfg-fg aa ©

5210-5240'

(43) MDS + muddy slts, aa ©

(57) ss, vfg-fg, aa © minor

VW chltzn

0.2 py
Tr. cpy
diss. grns, in ss, <50µ

5240-~~5300~~ 5270'

(41) mds + slts, aa ©

(59) ss, vfg-fg, aa, mostly v. lt. gray-buff to buff-white, lesser © probably in part silicified

0.3 py
Tr. cpy

(see also previous sample)

→ VW chltzn.

5270-5300'

**!

7% 3-10mm caved chunks of pale grayish-orange mudstone. Must be from above 1000 feet, and should be behind casing

(36) mds + slts ©

(4) ss, vfg-fg aa © mostly minor

[partially silicified; silica-cemented]

0.3 py
Tr. cpy

Logging Notes | ELMORE IW-3 | August 13, 2004

T. Hulen

5300-5330'

Very Fresh-Looking

(17) MDS & muddy slts, undivided matte v. lt. to lt. gray to sl. brnish-gray ©

(Tr) VVF -cal

(83) ss, vfg to fgr, v. lt. gray-buff to grysh-pink, extensively disaggregated ©

Tr chltzn.

0.3 py

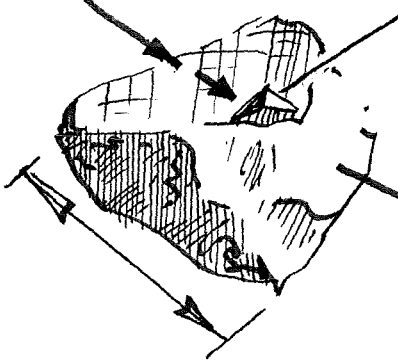
Tr cpy

5330-5360'

** DEFINITE INCREASE IN PYRITE [& cpy]

& sp appears **

cpy, sp



(21) MDS & muddy slts, mostly matte lt. gray; minor matte lt. grnsh-gray [wkly chlori-tized] © #

(3) VVF -cal -py -cpy -sp

1.5 py - dom'l diss pyritohedral 50-100μ

0.1 cpy

Tr sp

CHANGE

(76) ss, vfg-fg mostly minor → mostly pinkish-white buff white, & v. lt. gray buff

© #

43

5360-5390

① NOD ANH
some nodules replaced with s=

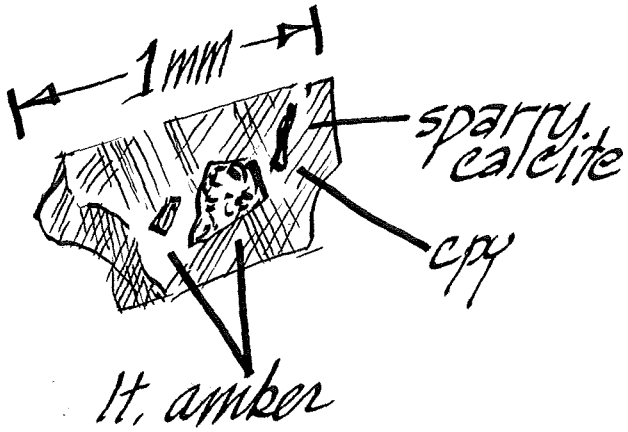
cpy spd

40 slts & MDS aa ©

56 ss vfg-fgr © F

3 VVF
- CAL
- py - ?
- cpy
- sp

0.3 sp
honey-yellow to yel.-brn. transp.-transl.
0.2 cpy
1.5 py



These are Williams & McKibbens (1987) stage 1 (prograde thermal, calcite-base metal ± veinlets)

5390-5420'

~~NOD~~ ANH ①

30 mds & slts aa ©

59 ss vfg-fg, aa © F

2 VVF
- cal
- cpy

0.5 sp
0.3 cpy
1 py

↳ one nod encapsulated in mudstone is u 2/3 bright brick red

5420-5450

① NOD ANH

63 mds & slts ©

35 ss vfg-fg aa © F

1 VVF
- cal
- cpy
- sp

0.2 sp
0.1 cpy
1 py

Logging Notes

ELMORE IW-3

J. Hulen
August 13, 2004

5450-5480'

Tr NOD ANH

65 MDS & muddy slts, matte lt.-med. gray to sl. grnsh-gray ©

35 SS vfg-fg ◌, v. lt. gray-buff to lt. gray w/ scattered tinges of greenish-gray ©±

Tr chltzn. =

Tr VVF
- cal
- cpy
- sp

0.1 sp
Tr. cpy
0.3 py

5480-5510'

50 MDS & muddy slts, aa ©

44 SS, vfg-fg, aa ©±

VW chltzn

Tr VVF
- cal
- cpy
- sp

0.2 py
Tr. cpy

5510-5540'

Tr Nod anh

64.5 MDS & muddy slts, aa ©

35 SS vfg-fg, aa ©±

VW chltzn

0.5 VVF
- cal
- qtz ?
- cpy
- sp
- py

1 py
0.2 cpy
0.1 sp

1 Tr in mds.

5540-5570'

Tr GG → v. lt. grnsh to sl. yel-gray; trans-lucent, waxy-appearing

70 MDS & muddy slts, aa ©

29.5 SS vfg-fg aa ©±

W chltzn

0.5 VVF
- cal
- py
- cpy

1 py
0.1 cpy

1 v gg & on mds

45

08/16/04

FINALLY!

5570-5600'

(11) on gg (0.5) GG, aa, waxy-textured, v. lt. gray-green, translucent, sheared.

(0.5) VVF: cal, py, cpy

0.3 py

© ⇑ (23) MDS & muddy s/ts, aa, matte lt. gray to slightly greenish-gray

© ⇑ (15) ss, vfg-fg, sbr, v. lt. gray-buff to v. lt. grnsh-gray

w. chltzn

** (3) PUMICE; White; pure white to sl. greenish-individual chips up to 2 mm major axis; spongy-textured to filamentous

probably drilling-disaggregated from tuff

** (2) FELSITE, v. lt. greenish-gray to v. lt. v. sl. orange-gray; cryptocrystalline, flinty to porcellaneous

© ⇑

** (56) sandy TUFF mottled v. lt. greenish-gray & v. lt., sl. orange to sl. pinkish-gray; 20-40% (depending on chip) v.f – f. sand grains, mostly quartz & feldspar; up to 10% (in single chips – 2-3% overall) felsite clasts, ± up to 1 mm at least, aa; 3% pumice clasts/shards ∠0.5 mm, aa; Remainder vxln/pyroclastic matrix, v. lt. grnsh- to sl. pinkish- & orange-gray; dull-porcellaneous-

$ presumably lithified, very fine ash for the most part.

46

Logging Notes — ELMORE IW-3

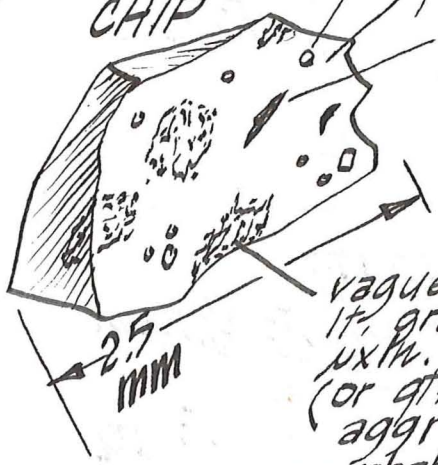
J. Hulen
August 16, 2004

5600–5630'

Tr GG aa

37 MDS + slts aa © > matte lt. gray to lt. grnsh.-gray

1 Tr. on GG TUFF CHIP



- probably wholly altered pumice shards.

13 © SS vfg-fg aa w chitzn

3 PUMICE white aa

2 FELSITE, aa

0.5 VVF cal, py

0.2 py

44.5 TUFF, sandy aa (see previous page)

5630–5660'

1% CEMENT

Tr. GG

1 Tr. aa

Tr NOD ANH

2 PUMICE aa

1 FELSITE aa

7 SS aa © vfg-fg w chitzn.

57 MDS + slts matte lt. gray to sl. grnsh-gray AA ©

Tr VVF cal

33 sandy TUFF aa

Tr. py

5660–5690'

1 Tr. on MDS

86 MDS & slts aa, but darker (to med.) gray & w/less green) ©

5 sandy TUFF aa [incl. pumice & felsite chips]

9 SS vfg-fg aa

Tr. chitzn ©

0.1 py

~~AC~~

5690-5720'

(83.5) MDS slts, matte lt.-med. gray to sl. brnish.-gray

(C)

prob. caved (3) sandy TUFF aa

(C)

Tr. chltzn.

(0.5) VVF -cal -cpy -py

(13) SS, vfg, ~~ss~~, v. lt. gray-buff to grayish-pink

0.1 py
Tr. cpy

5720-5750'

(86) MDS & slts., aa

(C)

Very fresh-looking

(1) TUFF aa CVD

(13) SS, vfg aa

(C) Tr. chltzn.

Tr. py

5750-5780'

(82) MDS & muddy slts., aa

(C)

(11) SS, vfg aa

(C)

(1) VVF -cal

Tr. py

5780-5810'

(76.5) MDS & slts., aa

(C)

seemingly becoming darker gray with depth

(23) SS, vfg-fg, buff-white, pinkish-white, and v. lt. gray-buff

0.4 py

(0.5) VVF -cal

(C)

Logging Notes

ELMORE IW3

J. Hulen
Aug. 16, 2004

5810-5840'

Very Fresh-Looking

Tr. py

(63) MDS and argillaceous slts., ~~SS~~, aa; ~~MDS>>slt~~
MDS >> slts. → both comm. micaceous
©

(37) SS, vfg, 1% buff-white, pinkish-white & v. lt. gray-buff, commonly speckled w/ dark-gray [<2%]
©

5840-5870'

Cuttings Coarser

0.1 py

(79) MDS & SLTS, aa
©

(21) SS, vfg, aa
©

5870-5900

Cuttings Finer Again

0.3 py [mostly vxln, bdd syng., in mds]
Tr SP

(83) MDS & muddy slts., aa
©

(17) SS, vfg, aa
©

5900-5930'

More Intense Alt'n.

Tr. Py

(75) MDS & muddy slts., aa

both ©
- 3/5 — med. to dk. gray, aa
- 2/5 — v. lt. grnsh-gray to grayish green sub-translucent

49

(25) SS, vfg-fg aa, but dom. colors are v. lt. grnsh-gray & v. lt. greenish-buff.
©
W chl/tzn.

5930-5960

→ muddy s/ts.

(39) MDS ~~& s/ts~~, aa exc. less alteration ©

(61) ss, vfg-fg aa, exc. less green ©

0.2 py

Very Fresh-Looking

5960-5990'

(70) MDS & s/ts, u 2/3 v. lt. grysh-green; u 1/3 — mgtte, lt.-med., sl. brnish. gray ©

(30) ss, vfg, aa ©

W. chltzn.

0.3 py
Tr. cpy

5990-6020'

4 R$S

(Tr) nod. arth.

(77) MDS & s/ts. aa ©

(23) ss, vfg aa, VW chltzn ©

0.4 py
0.1 cpy

More intensely ordered

CHLTN. OBVIOUS

6020-6050'

(33) MDS & s/ts aa ©

(67) SS, vfg-fg, mostly v. lt. to lt. gray-green to buff-green aa; u 1/5 v. lt. gray-buff to buff-white. © ±

0.2 py
Tr. cpy

NEXT PAGE

Logging Notes, ELMORE IW-3 J. Hulen 08/16/03

6050-6080'

u 30% CVD

(Tr) Nod. anh

(43) MDS & (muddy) s/ts., matte, lt., s. brnsh-gray & lt. greenish-gray ©

u (57) ss, vfg v. lt gray-buff, v. lt. grysh-pink, v. lt. grnsh-gray ©

0.2 py

~~6080-6110~~

6080-6100'

u 60% CAVED CHIPS (CVD)

CHANGE TO 20-ft SAMPLES

—all AA??—

(difficult to read through the debris)

0.3 py Tr cpy

6100-6120'

u 15% CVD & INCOMPLETE WASH

u (63) MDS & s/ts, aa ©

u (37) ss vfg, aa ©

0.2 py

6120-6140'

RELATIVELY LARGE CHIPS BUT THESE DO NOT APPEAR CAVED

& much darker mudstone.

(54.5) ss mostly buff-white vfg ©

(45) MDS & muddy s/ts, mostly med. med. dark, sl. brnsh matte gray © #

(0.5) VVF -cal -cpy

* Tr. SP - honey yellow & transp.

0.+ cpy (Tr)

0.3 py

51

6140–6160'

5% CVD

(26.5) MDS & slts, matte lt.-med grnsh-gray, gray & sl. brnsh gray ©

(78) SS, vfg buff-white aa ©

(0.5) VVF –cal –cpy –sp

0.1 SP [honey yellow]

Tr. cpy

6160–6180'

(37) MDS & slts aa ©

(63) SS, aa © vfg

Tr. py

6180–6200'

Very Fresh

(26) MDS & slts aa ©

(74) SS, vfg buff-white, aa ©

0.2 py

6200–6220'

(52) MDS & slts aa ©

(48) SS, vfg, aa ©

Tr. py

6220–6240'

~~(48)~~ (44) MDS & slts. aa ©

~~(52)~~ (56) SS, vfg, aa, ©

Tr. py

6240–6260'

(61) MDS & slts aa ©

(39) SS vfg, buff-white, aa ©

Tr. py

still Very Fresh

52

(Tr) VVF –cal

Logging Notes

ELMORE IW-3

J. Hulen
Aug. 16, 2004

Very Fresh

6260–6280'	(63) MDS & muddy SLTS, matte; lt.–med. gray to sl. brtish-gray ©	(37) SS, vfg, , buff-white to v. lt. gray-buff ©	Tr. py
∪ 7 CVD ∪ 4 LIG			
6280–6300' VERY FRESH	(45) MDS & slts aa ©	(55) SS, vfg aa ©	Tr. py
6300–6320'	Very Fresh (55) MDS & slts aa ©	(45) SS, vfg, aa ©	0.1 py
6320–6340'	— All AA —		Tr. py
6340–6360'	Very Fresh (60) mds & slts aa ©	(40) SS, vfg buff-white, aa ©	Tr. py
6360–6380	Very Fresh. Remarkably consistent sequence © Boring	(47) ss vfg aa © (53) mds & slts, aa ©	Tr. py 53

6380-6400'

Very Fresh

(64) MDST & (66) muddy s/ts, lt-med., sl. brownish-gray, commonly micaceous ©

(34) SS, vfg, [illegible], buff-white to v. lt. gray buff ©

Tr. py

6400-6420'

(45) MDS & s/ts, aa ©

(54.5) SS vfg, aa ©

(0.5) VVF -cal.

Tr. py
Tr cpy.

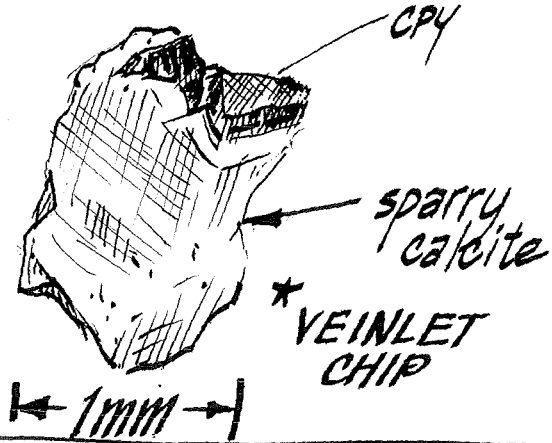
6420-6440'

(41) MDS, s/ts, aa ©

(58.5) SS, vfg, aa ©

(0.5) * VVF -CAL -CPY

0.1 cpy
0.1 py



6440-6460'

(43) MDS, s/ts, aa ©

(56.5) SS vfg, aa ©

(0.5) VVF -CAL

0.3 PY
Tr cpy

Monotonously Fresh

54

Logging Notes | ELMORE-1W3 | J. Hulen Aug. 17, 2004

Very-Fresh

6460-6480'

(37) MDS & muddy s/ts., matte lt. to [mostly] med. gray; commonly micaceous ©

(62) SS vfg-fg, buff-white to v. lt. gray-buff, comm. 1-2% speckled with dark gray ©

(1) VVF -CAL, colorless, clear, "sparry"

0.1 PY
Tr. cpy

6480-6500'

Appearance of tr. PO

RX Still Very Fresh

(75) MDST & s/ts. mostly matte, med.-dk., sl. brownish-gray; commonly micaceous ©

(25) SS vfg aa ©

(Tr) VVF -CAL, po

Tr. PO
0.1 PY

6500-6520'

7 CVD

(45) MDS & s/ts aa ©

VERY FRESH

(55) SS, vfg, aa ©

(Tr) VVF -CAL

Tr. PY

6520-6540'

5 CVD

—all AA—

55

Tr. PY

6540-6560'

Finer cuttings

VERY FRESH

** TRACE OF EPIDOTE APPEARS

Tr.* (EP) [diss. in SS]

0.1 PY

(76) MDS. & slts., matte, lt.-med., sl. brownish-gray (C)

(24) SS vfg, aa (C)

→ i.e. ESS. UNALTERED

6560-6580'

Very Fresh

(73) MDS & slts. aa, (C)

(27) SS vfg, aa (C)

Tr. py

6580-6600'

(70) MDS & slts aa (C)

(30) SS vfg, aa (C)

(Tr) VVF — CAL — PO

Very Fresh

Tr. PO

0.1 PY

6600-6620'

Incomplete Wash

(Tr.) mod. anh.

Very Fresh

— otherwise all aa —

Tr- py

Tr cpy → [repl. mod. anh]

6620-6640'

Very Fresh

(83) MDS & slts. aa, (C)

(17) SS vfg, aa (C)

Tr. py

Logging Notes — ELMORE-IW3 — J. Hulen 08/17/04

6640–6660'

1. Very Fresh

2. Trace of pyrrhotite (non-magnetic variety) repl. nod. anhydrite

(Tr) Nod anh.

0.7 PY
0.2 po
tr. cpy

(0.5) VVF
- CAL
- ANH
- PO

(85) MDS & muddy slts, lt.-med., matte gray, comm. micaceous ©

(14.5) SS, v. lt. gray-buff to brownish-gray, comm. speckled 1-3% w/ dk. gray, vfg-fg, ©

6660–6680'

(1) Nod. Anh.

Very Fresh

(83.5) MDS & slts, aa, exc. more micaceous & comm. sandy ©

(15) SS, aa vfg ©

0.7 po *
0.7 py *
Tr. cpy

(0.5) VVF
- CAL
- PO
- PY

* po is non-magnetic, occurs as vein lets < 0.3 mm. thick, and as diss. anh-subh. grains < 0.1 mm to 0.3 mm dia [& mostly in mds.]

* PY mostly as bdd vxln. aggregates (syngenetic)

6680–6700'

Very Fresh

(0.5) Nod anh

(91) MDS & slts

u 2/5 matte lt.-med. gray, aa

u 3/5 v. lt., matte sl. greenish-gray; feebly translucent ©

(8) SS vfg, aa ©

(0.5) VVF
- CAL
- PO
- PY

0.3 po
0.2 py

57

6700-6720'

Fresh

(1) Nod anh

(88) MDS & slts matte lt-med. gray to gr-brnish-gray; comm. micaceous & sandy (C)

(11) SS vfg, aa (C)

(1) VVF
- CAL
- PO
- PY

1 py
0.3 po

6720-6740'

Very Fresh

(77) MDS & s/ts, aa (C)

(23) SS vfg, aa (C)

(Tr) VVF - CAL

0.5 PY
Tr. cpy

6740-6760'

Very Fresh

(75) MDS & s/ts, aa (C)

(25) SS vfg, aa, but commonly grayish-brn, & micaceous (C)

(Tr) VVF - CAL

0.3 py
Tr. po

6760-6780'

Even Fresher

(87) MDS & s/ts, aa, mostly matte, med., sl. brownish-gray (C)

(13) SS vfg, aa (C)

(Tr) VVF
- CAL
- PY
- PO

0-3 py
Tr. Po

Logging Notes **ELMORE IW-3** J. Hulen

Aug. 17, 2004

6780-6800

Very Fresh

0.3 py
& Tr. cpy

(2) Nod anh, white-lt. gray, translucent f-mxln (recrystallized) comm. peripherally replaced w/ pyrite

(87) MDS & muddy slts, aa, mostly lt.-med, sl. brownish-gray. Comm. micaceous and sandy

(11) SS vfg, buff-white, v. lt. gray-buff, minor lt.-med brnsh-gray (the latter commonly micaceous.

6800-6820'

BROKEN Sp-cpy VNLT ≥ 1 mm originally

Very Fresh

SP (Tr)
Tr BN
Tr. CPY
0.2 PO
0.7 PY

(1.5) Nod. anh.

(81) MDS & slts, aa

(17) SS aa

(0.5) VVF
- SP
- CAL
- bn
- py
- cpy

6820-6840'

Very Fresh

Tr. BN
Tr. CPY
0.1 PO
0.5 ~~PO~~ py
~~0.5 ...~~

(0.5) Nod Anh

(81) MDS & slts aa

(18) SS vfg aa,

(0.5) VVF
- CAL
- BN
- PO
- CPY

6840-6860'

Large Cuttings but not Caved

Very Fresh

(1) nod. AN aa

(76) MDS ¢ s/ts aa ©

(23) SS Vfg, aa ©

(Tr) WF

CAL

0.2 py
Tr. cpy

6860-6880'

Very Fresh

(70) MDS ¢ s/ts. aa ©

(30) SS vfg, aa ©

0.4 py
Tr. cpy

6880-6900'

Very Fresh

(72) MDS ¢ s/ts., aa ©

(28) SS Vfg, aa ©

0.4 py
Tr. cpy

6900-6920'

Very Fresh

(1) Nod anh

(B) MDS ¢ s/ts, aa ©

(26) SS vfg, aa ©

0.5 py

6920-6940'

Very Fresh

(68) MDS ¢ s/ts., aa ©

(32) SS Vfg, aa ©

0.3 py

REMARKABLY CONSISTENT SEQUENCE

Logging Notes | ELMORE-IW3 | J. Hulen Aug. 17, 2004

6940-6960'

(63) MDS, & muddy slts, mostly matte lt. med sl. brownish gray; commonly sandy ©

(37) ss, vfg-fg, variously buff-white, lt. gray-buff, & lt.-med. brnish-gray; also lt., sl. grnsh.-gray some chips v. argillaceous → these appear waxy & subtranslucent. ©

0.1 ~~Tr~~ BN
0.5 py
0.1 cpy
0.1 PO

Very Fresh

vw chltzn.

6960-6980'

(55) MDS & muddy slts, aa
u 2/3 med. gray
u 1/3 lt. grnsh. to brnsh-gray & subtranslucent overall © ~~Tr~~

(45) ss, vfg-fg, aa (u 4/5) → to brnsh.
~~u 2/3~~
~~u 1/3~~ lt. grnsh-gray ~~& subtranslucent~~
(u 1/5)
overall © vw chltzn

0.2 py
Tr. cpy.

Very Fresh

6980-7000'

(43) MDS & slts aa ©

(57) ss, vfg-fg aa ©

vw chltzn.

0.4 py
Tr cpy

Very Fresh

7000-7020'

(43) MDS & slts, aa ©

(57) ss, vfg-fg aa, exc. u 1/4 → is bright pinkish-white ©

61

SWITCH TO 10-FT SAMPLES

7020-7030'

0.5 Nod anh

42 MDS & slts, aa ©

57.5 SS, vfg, aa ©

vw chltzn.

0.7 py
0.1 cpy

7030-7040'

EPIDOTE SUDDENLY APPEARS

37 ~~34~~ MDS & muddy slts, aa ©

~~60~~ 63 SS ©

vfg-fg

range of colors: buff- to pinkish-white, v. lt. gray-buff, & v. lt.-lt. greenish-gray (chloritic) overall wk chltzn

Tr. BN
1.3 py
Tr. cpy
0.3 EP

7040-7050'

65 MDS & slts aa ©

35 SS vfg-fg, aa © ; chips richer in epidote have conspicuously greater inter-granular porosity

W CHLTZN

Tr. cpy
0.5 py
1 EP

Logging Notes

ELMORE - IW3

J. Hulen

Aug. 18, 2004

7050-7060'

(77) MDS & muddy s/ts. aa, matte lt.-med. gray to s.t. grnsh-gray ©

(23) SS, vfg-fg, dd, buff- to pinkish-white, v. lt. gray-buff and v. lt. grnsh-gray

VW chltzn. ©

0.3 EP
0.7 PY
0.2 PO

(Tr) NOP anh

white, vxln.

7060-7070'

(55) MDS & s/ts aa ©

(45) SS vfg-fg aa ©

VW chltzn

0.4 EP
0.3 PY
Tr. PO
Tr. BN

(Tr) VVF - CAL

7070-7080'

— all aa, exc. ~1/2 the SS is grnsh-gray & more argillaceous

W chltzn

→ Epidote diminished

Tr. EP
0.2 py
Tr. cpy

7080-7090'

(49) MDS & s/ts, aa ©

(51) SS, vfg aa ©

Tr. chltzn

0.4 EP
0.5 PY
0.1 cpy

63

7090-7100

Big increase in epidote

(27) MDS & slts aa ©

(73) SS, vfg-fg, ◉, quartz-rich; mostly pinkish- to buff-white comm. subtranslucent ©

only Tr chltzn

1.5 EP [diss in SS]
0.5 py
Tr. cpy

7100-~~7120~~ 7110'

(73) MDST & slts, aa ©

(27) SS, aa ©

Tr. chltzn.

~~0.1~~ BN
0.1 cpy
0.5 EP
0.3 py

7110-7120'

More SS again

(32) MDS & slts, aa ©

(68) SS vfg, aa © Tr. chltzn

1.3 EP
0.3 py
Tr. cpy

7120-7130'

(42) MDS & slts aa ©

(58) SS vfg, aa © Tr. chltzn

1.3 EP
Tr. PO
0.1 BN
0.3 py
0.1 cpy

Logging Notes | ELMORE-IW3 | Aug. 18, 2004 J. Hulen

7130–7140'

(22) MDS & muddy slts, mostly matte, lt., sl. brnsh. gray. © — to med.

(78) SS, vfg–fg, buff- to pinkish-white, v. lt. gray-buff, & v. lt., sl. grnsh-gray; well-sorted, "clean" looking. ©

0.7 EP [diss. in SS]
0.3 py
Tr. cpy

VW Chilton

7140–7150'

MUCH "CLEAN" SAND

(19) MDS & muddy slts., aa ©

(81) SS, vfg-fg aa ©

0.5 EP
0.3 py

7150–7160'

(37) MDS & muddy slts aa ©

(63) SS, vfg-fg, aa ©

0.3 EP
0.2 py

7160–7170'

— all aa —

0.2 EP
0.2 py

(65)

7170-
7180'

Tr. Nod. anh

partially altered to pyrite

(48) MDS & slts, aa ©

(52) ss, vfg, aa ©

tr. chltzn.

0.3 EP
0.3 py
Tr. cpy

7180-
7190'

(27) mds & slts, aa ©

(13) ss vfg, aa ©

(Tr) VVF - cal.

Tr. chltzn

Tr. BN
Tr. cpy
0.3 py
0.5 EP

7190-
7200

(42) MDS & slts, aa ©

(58) ss aa ©

(Tr) VVF - cal

Tr chltzn.

0.3 EP
0.2 py
Tr. cpy

"7200-TD"

EXTENSIVE CAVING

0.7 PY
Tr. cpy
Tr. EP

(1) VVF - cal

** (1) GG & UBX mottled lt. gray-buff & lt. grayish-green; some chunks clearly sheared.
one pc. mnrlzd. w/ 5% diss. pyrite

↳ 25-30 CAVED CHIPS

Tr ~~other~~
NO

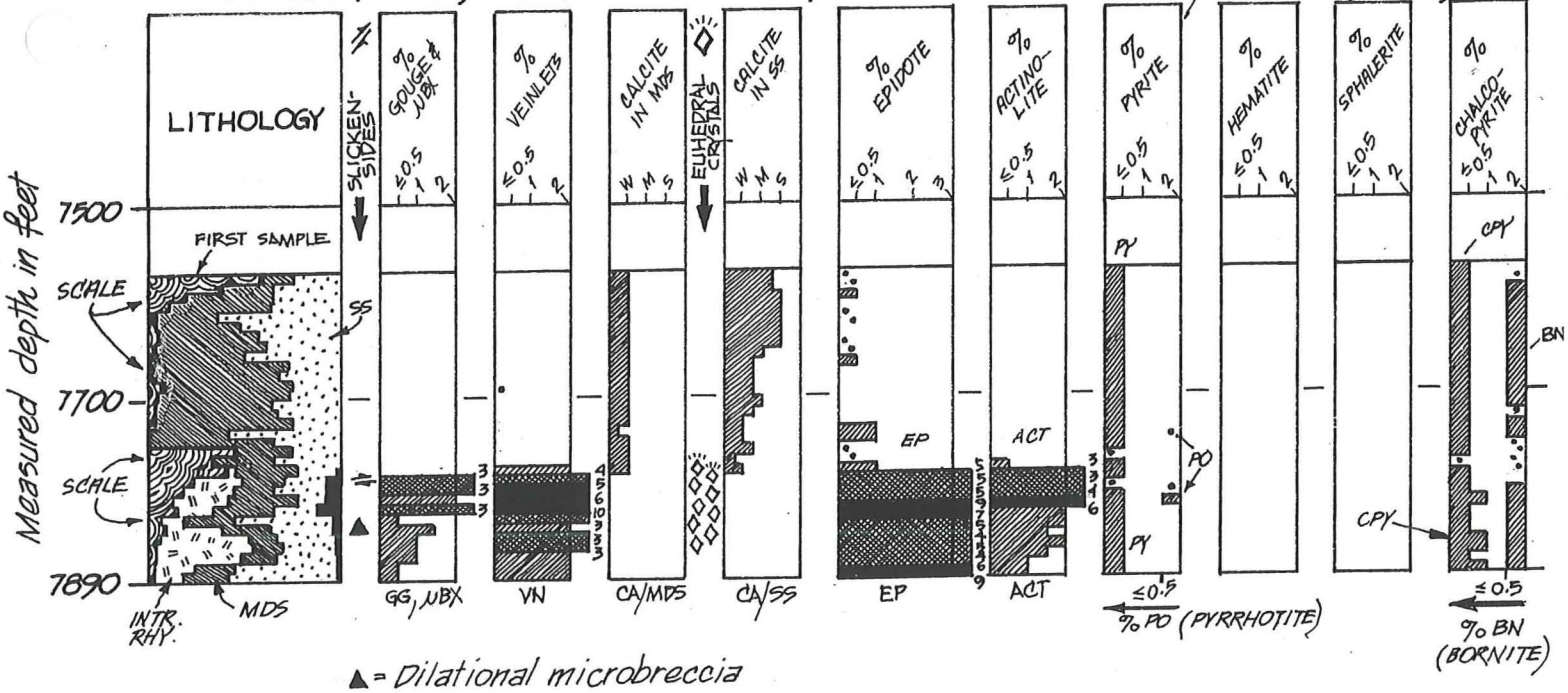
↳ (37) ? MDS & slts, aa matte, lt.-med., sl. brnsh.-gray ©

↳ (61) ? ss, vfg, aa ©

the END

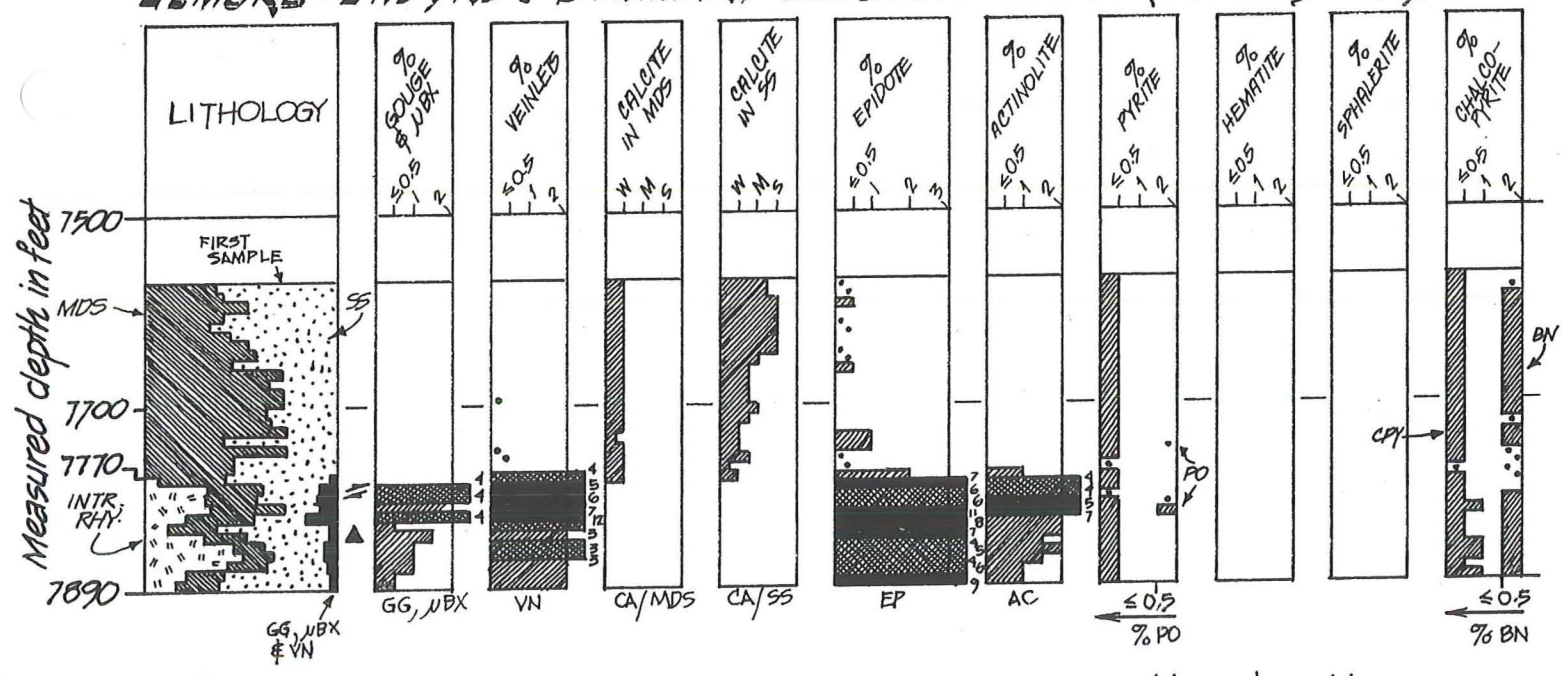
66

** WELL ELMORE-IW3, REDRILL≠: SUMMARY GEOLOGIC LOG I (w/scale deposits)



▲ = Dilational microbreccia

** ELMORE-IW3, RD≠: SUMMARY GEOLOGIC LOG II (excluding scale)



NOTE: THE INTERVAL 7770-7890 IS INTERPRETED AS A FAULT/FRACTURE ZONE INTRUDED BY ONE OR MORE MICROCRYSTALLINE RHYOLITE DIKES. POROSITY & PERMEABILITY IN THE DIKES HAVE BEEN ENHANCED BY NATURAL HYDRAULIC FRACTURING. THE DIKES, HOST ROCKS, GOUGE, & MICROBRECCIA HAVE BEEN HYDRO-THERMALLY SILICIFIED, & CALC-SILICATE-ALTERED & WEAKLY SULFIDIZED, AS WELL AS EXTENSIVELY VEINED WITH VARIOUS COMBINA-TIONS OF THE MINERALS QUARTZ, EPIDOTE, ACTINOLITE, PYRITE, CHALCOPYRITE, AND BORNITE.

** Explanation on page 2

≠ Or deepening: drilled 07/05/97-07/07/97: depth interval 7572-7889'.

(DRAFT)
J. Hulen 09/12/04

SUMMARY GEOLOGIC LOG FOR ELMORE-IW3, RD*: EXPLANATION

LITHOLOGIES AND CONTAMINANTS

Geothermal scale deposits; multiple textural and mineralogic types; at minimum, as follows:

① Laminated silica, dominantly opaque to translucent white to light gray w/minor pale to deep orange-brown. A few interlaminae of dark orange-brown amorphous iron silicate. Probable trace to minor gray colloidal sulfides (± arsenides/antimonides).

② Microgranular silica, massive to crudely laminated, mostly pale dull orange to buff, but also bone white; "micro-saccharoidal"

③ Silica-sulfide (± arsenides, antimonides). Aggregates of opaque bone white, gray, dull orange, or buff microcrystalline silica (same as "2" above) intergrown with dull, medium to dark gray submetallic grains and grain aggregates. The grains are subequant and typically 20-100 μ in diameter; aggregates are irregular to crudely arborescent and up to 0.5 mm in major-axis length. With few exceptions, sulfide : silica ≤ 1:1

④ Sulfide (± arsenide/antimonides), mostly matte medium to dark gray; commonly tarnished to "peacock" hues. Overall microcrystalline, but with a few euhedral grains up to at least 0.2 mm dia. rare powdery green oxidation. Includes traces of chalcopyrite. In part transitional to type 3 (see above).

⑤ Bladed calcite. Loose, porous aggregates of randomly-oriented to subparallel scales and blades typically 0.3-1 mm in width. The carbonate is typically transparent to translucent light gray, and commonly intergrown with type 4 (see above) metallic phases.

⑥ Blocky calcite. Transparent, colorless ("water-clear"), euhedral crystals and crystal aggregates up to 1.5 mm. in diameter. Commonly encapsulating and/or encrusted by metallic phases of type 4 (see above).

⑦ Hybrid and other scales. Various combinations of all the above scale types, and other scales that do not fit readily into any of the described major categories.

Sandstone, very fine- to fine-grained; moderately- to well-sorted; lithic arkose to subarkose. Matrix sericite-calcite above 7780'; calc-silicate/quartz below that depth.

Lacustrine and fluvial mudstone and muddy siltstone, undivided. Mudstone : siltstone typically >3:1.

Intrusive rhyolite, opaque to translucent, pinkish-white to very light pinkish-gray, commonly tinged with gray green. Massive, microgranular, aphyric, "flinty" aspect. Superficially resembles silicified mudstone.

Gouge, microbreccia, and veinlets, undivided.

SYMBOLS

- Euhedral crystals
- = Slickensides
- % Per cent (volume)
- • Trace
- ▲ Dilational microbreccia
- ≤ Less than or equal to

ABBREVIATIONS

- AC, ACT – ACTINOLITE
- BN – BORNITE
- CA – CALCITE
- CA/MDS – CALCITE IN MUDSTONE
- CA/SS – CALCITE IN SANDSTONE
- CPY – CHALCOPYRITE
- EP – EPIDOTE
- GG – GOUGE
- INTR. – INTRUSIVE
- μBX – MICROBRECCIA
- M – MODERATE
- MDS – MUDSTONE
- PO – PYRRHOTITE
- PY – PYRITE
- RHY – RHYOLITE
- S – STRONG
- SS – SANDSTONE
- VN – VEIN
- W. – VEAK
- W/ – WITH

* or deepening: drilled 07/05-07/07/97: depth interval 7572-7889'

(DRAFT)
J. Hulen, 09/12/04

	% RX					% 2nd minrls. in RX					
	MDS	SS	RHY	GG	VN	EP	AC	PY	PO	CPY	BN
7570-80'	38	62				Tr.		0.5		0.1	
80-90'	41	59				Tr		0.5		0.2	tr.
7590-7600'	54	46				0.1		0.3		0.5	0.1
7600-10'	41	59				—		0.1		0.6	0.2
7610-20'	34	66				Tr.		0.3		0.3	0.2
20-30'	46	54				Tr.		0.3		0.3	0.2
30-40'	55	45				—		0.3		0.6	0.3
40-50'	59	41				Tr.		0.3		0.3	0.1
50-60'	47	53				Tr		0.4		0.3	0.2
60-70'	72	28				0.1		0.2		0.2	0.1
70-80'	65	35				—		0.2		0.2	0.2
80-90'	72	28			~~Tr~~	—		0.3		0.2	0.2
7690-7700'	72	28			Tr.	—		0.1		0.3	0.1
00-10'	64	36			—	—		0.1		0.2	0.1
10-20'	67	33			—	—		0.2		0.3	0.2
20-30'	74	26			—	—		0.1		0.2	Tr
30-40'	40	59			—	0.7		0.1		0.3	0.2
40-50'	~~84~~ 65	35			Tr.	1		0.1		0.3	0.2
50-60'	47	53			+ Tr	Tr.		0.2		0.2	Tr
60-70'	47	53			—	Tr.		Tr		0.2	Tr
70-80'	34	54	8.5		3.5	2	1	0.2		Tr	Tr
80-90'	28	30	33	4	5	6.5	4	0.4		0.1	Tr
7790-7800'	28	31	31	4	6	6	~~5~~ 4	~~0.4~~ Tr.	~~Tr~~	~~0.6~~ 0.2	~~0.3~~
00-10'	40	17	34	2	7	6	5	0.4	Tr	0.6	0.3
10-20'	35.5	27	22	3.5	12	10.5	7	~~0.8~~ 0.6	0.1	0.8	0.1
20-30'	~~72.5~~ 27	57	12.5	0.5	3	7.5	2	0.3	—	0.3	0.2
30-40'	22.5	43	32	1.5	2	7	2	0.3	—	0.3	0.2
40-50'	16	32	48	1	3	4	1.5	0.3	—	0.5	0.2
50-60'	16	28	52	1	3	5	2	0.3	—	0.7	0.4
60-70'	20	32	45	1	2	4	1.5	0.3	—	0.7	0.3
70-80'	21.5	54	22	0.5	2	6	1	0.3	—	0.5	0.3
7880-7890'	21.5	57	17	0.5	2	9	1	0.5	—	0.7	0.1

ELMORE-IW3 RD (or Deepening): Chips' compositions recalculated to exclude geothermal scale deposits

JH 09/10/04

ELMORE-IW3, RD

J. Hulen
09/08/04

7570-7580'

Initial impression: Very complex cuttings sample w/chips of indigenous clastics that are impressively veined, altered, and mineralized; and w/abund. chips of numerous types of scale

A. SCALE

A.1. 8%

Finely amorphous to cryptoxln. Laminated silica: dominantly opaque to translucent white to lt. gray, porcellaneous to "waxy" vitreous; lesser pale to deep orange-brown, also porcellaneous to vitreous mostly, but with darker, thicker bands ranging to ugranular-resinous. Laminae range from <5μ to at least 0.5mm thick

- Probably opal ± chalcedony locally stained w/ FeOx and/or incorporating particulate FeOx &/or Fe silicate (hisingerite?); a few discrete up to 0.5 mm laminae of the latter. Tr. hematite; poss. also Tr. MnOx. (or colloidal sulfides, arsenides, or antimonides).

also tr. transl. grey-ish-gray

also a few brick-red & lt-med.-dk. transl. gray laminae

a few chip w/ botryoidal textures

also: most chips have laminae that are very gently curved

2mm SCALE TYPE A.1.

A.2. 12%

crudely laminated to massive, microgranular silica; dominantly pale, dull orange to buff; microsaccharoidal.

7570-7580' cont'd.

6%

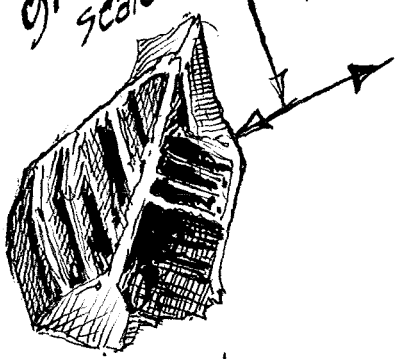
(A.3.) Same as A.2. but bone white

(A.4) SILICA-SULFIDE (± arsenide/antimonide). Aggregates of opaque white, gray, dull orange, or buff µx'l'n silica with intergrown, diss. equant 20-100µ dull med.-dk. gray submetallic grains as well as irregular to crudely arborescent masses of these grains up to at least 0.5 mm major axis. silica : sulfide ≤ 1:1 (some exceptions)

10%

(A.5.) SULFIDE (± arsenide/antimonide). mostly med. matte gray, tarnished commonly to "peacock" hues — µx'l'n aggregates — x's/grains typically < 20µ — a few are euhedral and up to at least 0.2 mm

single, unusual, partly skeletal gray metallic scale crystal



← 1 mm →

only a portion of this scale type is chalcopyrite.

→ look for "unusual" tarnish colors.

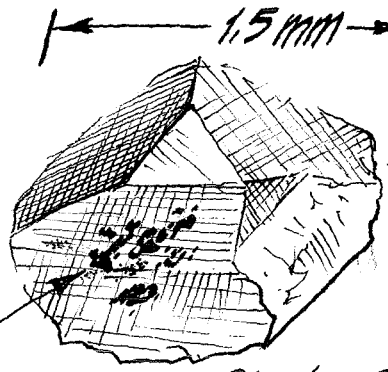
* Note: many of these chips contain minor amounts of granular silica — this (metallic) scale type is probably transitional to scale type A.4.

Logging Notes | ELMORE-IW3, RD | J. Hulen 09/08/04

7570-7580' (cont'd) | A. SCALE (continued)

3% (A.6.) Bladed calcite — loose, porous aggregates of randomly-oriented → to subparallel scales and thin blades, with these x/s. typically 0.3-1 mm in max. width; blades are transparent to translucent white to lt. gray, commonly intergrown with minor amounts of sulfides and other metallic phases same as those making up scale type A.5.

1% (A.7.) Blocky calcite — clear, colorless, euhedral x/s. up to 1.5 mm major axis — typically discrete but uncommonly as aggregates, also ≤1.5 mm major axis. Commonly incorporating or ~~encr~~ sparsely encrusted with metallic phases as above.



A.7. Blocky Calcite

10% (A.8) Hybrid scale chips — various combinations of ~~A.1-A.6~~ All the previous scale types

... as well as anomalous scale chips, too numerous to describe individually, that don't fit readily into any of the eight major categories

B. CHIPS OF INDIGENOUS (?) ROCK

(B.1.) MUDSTONE and muddy s/ts, undivided, well-indurated, matte, lt.-med. gray, non-calcareous (20%) to weakly calc. ©

→ some chips faintly translucent, esp. at edges.

calcite rhombs growing on otherwise unmineralized muddy s/ts.

(B.2.) 25%
SANDSTONE vfg, ~~◎~~ seemingly silicified (?) ranging in color from buff-white through very light gray buff to v. lt gray; opaque to subtranslucent.

contains ∿0.5% PY
0.1% cpy
Tr. epidote

© injection-related

Note: sandstone is moderately to strongly calcareous, which is unusual at this depth and Temp. consider the possibility that stale calcite (& maybe silica) has plugged primary or hydrothermal-secondary intergranular porosity/permeability

*** HOWEVER: © @ ~7200-TD" in orig. hole

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Logging Notes

ELMORE-IW3 RD

J. Hulen
09/08/04

7580-7590'

A. SCALE

A.1 — 4
A.2 — 8
A.3 — 3
A.4 — 7
A.5 — 7
A.6 — 2
A.7 — 1
A.8 — 7

39%

% aa

→ some of the larger tarnished cpy x/s & x/l clusters conceivably could be indigenous

B. INDIGENOUS

B.1. MDS and muddy s/ts, aa
25% ©

B.2. SS, aa, vfg-fg same colors.
36% ©

in RX:
0.5 py
Tr. EP
0.2 cpy
Tr. BN(?)

→ includes minor brownish ux/m blocky-calcite sulfide scale. very crumbly/fragile.

7590-7600'

A. SCALE

A.1 — 1
A.2 — 6
A.3 — 1
A.4 — 5
A.5 — 3
A.6 — 1
A.7 — 1
A.8 — 3

21%

% aa

B. INDIGENOUS

B.1 — MDS & muddy s/ts, matte lt-med.dk. gray, commonly translucent toward chip edges (v. well indurated) massive; laminations not present.
43% ©

in rock:
0.3 py
0.5 cpy
0.1 BN
0.1 EP

B.2 — SS, vfgr-fg
36% ~~o~~ to ~~o~~, colors range from bone white through buff white & v. lt. gray buff through v. lt.-transl. gray. seemingly silicified in part.
? ©

↳ B.3. veinlets — (Tr) cpy, ep, bn?

7600-7610' — scale dramatically diminished

→ BOTH BORNITE & ~~CALCITE~~ CPY PRESENT IN SS.

("peacock" tarnish disappears from the latter in HCl)

0.1% py ; 0.5% cpy ; 0.2% bornite all diss.

(10%) SCALE; ~~X~~ Mixture as described above

(Tr) VVF - bn, cpy, qtz

(53) MDS & muddy slts, firmly indurated; lt. to med. gray; translucent at chip edges. ©

(37%) SS, vfg-fg, ~~o~~ to ~~o~~; colors aa, but overall tending more to bright white — surely silicified in part. ©

Tr. ep

Chips smaller

7610-7620'

(4) SCALE

(Tr) VVF - bn, cpy, qtz

(33) MDS & muddy slts. aa ©

(63) SS, vfg-fg, aa ©

0.3 py
0.3 cpy
0.2 bn
Tr. ep

7620-7630'

Tr. cpy frags

(4) SCALE aa

(Tr) VVF - bn, cpy, qtz

(44) MDS & muddy slts, aa ©

(52) SS vfg-fg, aa ©

0.3 py
0.3 cpy
0.2 bn
cpy
Tr. ep

7630-7640'

(6) SCALE aa

(Tr) VVF - bn, cpy, qtz

~~(53)~~ (52) MDS & muddy slts aa ©

(42) SS, vfg-fg, aa ©

0.3 py
0.5 cpy
0.3 bn

7640-7650'

(4) SCALE, aa

(Tr.) VVF - bn

(57) MDS & muddy slts aa ©

(39) SS, vfg-fg aa ©

0.3 py
0.3 cpy
0.1 bn
Tr. ep

Logging Notes

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7650-7660'

(5%) SCALE, various types as described for 7570-7590'; likely caved.

(45) MDS & muddy slts, lt. to med. and med.-dk. gray, firmly indurated; translucent at chip edges. ©

Tr. EP
0.4 py
0.3 cpy
0.2 bn

(50) SANDSTONE, vfg to fg, ○° to ~~○°~~, silicified in part; colors in decreasing abundance are bone-white, buff white, v. lt. gray-buff, and v. lt. gray; colors translucent in part. ©

~1% of the rock is sulfide, concentrated in sandstone as diss. grains < 20μ to 0.2 mm in dia., & as irreg. aggregates of these grains up to 1 mm major axis.

[py ≥ cpy > bn]

7660-7670'

(3) SCALE aa [CVD]

(70) MDS & muddy slts, aa → ©, many of the lighter-gray chips have a faint greenish tinge (tr. chl?)

(27) SS vfg-fg, aa © ≠

(Tr) CHL/SS

0.2 py
0.2 cpy
0.1 bn
0.1 EP

7670-7680'

(4) SCALE aa [CVD]

(63) MDS & muddy slts same as immediately above. ©

(33) SS vfg-fg aa, exc. ~1/3 of chips are transl, lt. greenish-gray

(W) CHL/SS

©

0.2 py
0.2 cpy
0.2 bn

7680-7690'

(10%) SCALE aa [CVD]

(65) MDS & muddy slts. aa (C) most chips have greenish tint to gray

(25) SS vfg-fg aa (W) chl/ss (C)

0.3 cpy
0.2 py
0.2 bn

7690-7700'

(5) SCALE aa [CVD]

(Tr) VVF - bn, cpy

(68) MDS & muddy slts., aa greenish-gray; translucent (C)

(27) SS vfg-fg aa (C) W chltzn/ss

0.1 py
0.3 cpy
0.1 bn

7700-7710'

(4) SCALE aa [CVD]

(61) MDS & muddy slts., aa (C)

(35) SS vfg-fg, aa (C) W chltzn

0.1 py
0.2 cpy
0.1 bn

7710-7720'

(3) SCALE aa [CVD]

(65) MDS & muddy slts. aa (C)

(32) SS vfg-fg, aa (C) W chltzn

0.2 py
0.3 cpy
0.2 bn

7720-7730'

~5% LCM

(3) SCALE aa [CVD]

(72) MDS & muddy slts aa (C)

(25) SS vfg-fg aa (C) W chltzn

0.1 py
0.2 cpy
Tr. bn

Logging Notes

ELMORE-IW3, RD

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7730-7740'

Tr. rust
Tr. LCM

Pronounced increase in sandstone & epidote

(1) ~~Tr~~ SCALE, as described for 7570-7580' (p.1) [CVD]

(40) MDS & muddy slts; msv: range of colors: v. lt. to med. gray; lt.-med. grnsh-gray; comm. translucent, esp. at chip edges; ⓒ ± [~5%] also a few buff-white mds chips that permissibly could be tuffaceous ← these chips ⓒ

(59) SS, vfg, % to %; color range → bone wht, v. lt. gray buff, & lt. greenish-gray; comm. translucent, particularly at chip edges. [APPEARS TO HAVE LITTLE INTERGRANULAR φ, k] ⓒ

(Tr) VVF - cpy, bn, qtz

diss

0.7 EP
0.1 py
0.3 cpy
0.2 BN

7740-7750'

(1) SCALE aa [CVD]

(Tr) VVF - ser - cpy, bn qtz

(64) MDS & muddy slts, aa, incl. ~7% bone white to v. lt. gray-buff, somewhat porcellaneous chips that could be tuffaceous ⓒ

(~35?) SS, vfg-fg aa (may include some coarse slts) ⓒ

1 EPIDOTE
0.3 cpy
0.2 bn
0.1 py
Tr. po?

7750-7760'

SEE REVERSE PAGE

Abundant, presumably caved scale.

7750-7760'

47%

SCALE, as described for 7570-7580'

%	A.1	5
	A.2	15
	A.3	3
	A.4	12
	A.5	7
	A.6	Tr
	A.7	0
	A.8	5
		47%

(47) MDS & muddy slts aa ©

(25) SS vfg-fg aa ©

0.1 cpy
0.1 py
Tr. bn
Tr. EP

(Tr) VVF -cpy

VW chltzn

7760-7770'

(34) SCALE, aa

%	A.1	~~3~~	4
	A.2	~~9~~	11
	A.3	~~1~~	1
	A.4	~~7~~	8
	** A.5	~~5~~	6
	A.6	Tr	Tr
	A.7	Tr	Tr
	A.8	~~3~~	4
		~~28~~	34

(31) MDS same as 7730-7740' ©

(35) SS vfg-fg dominantly v. lt., sl. greenish-gray chalky to approaching porcellaneous very argillaceous & possibly tuffaceous

THIN SECTION

V. W. chltzn.

© 1

** a few chips surficially oxidized to powdery bright green

Tr. ep
Tr. py
0.1 cpy
Tr. BN

Logging Notes

ELMORE-IW3, RD

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Vein Actinolite Appears

7770-7780'

41% SCALE, as described for 7570-7580':

% scale type	
A.1	5
A.2	13
A.3	3
A.4	9
A.5	7
A.6	Tr
A.7	0
A.8	4
	41

ep, act.

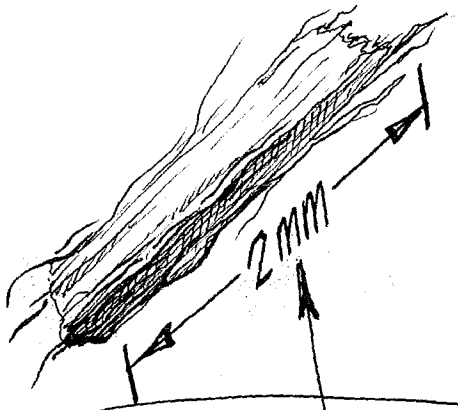
2% VVF act, ep, cpy, bn, gtz

~5% RHYOLITE (?) (?)
aphanitic, 0x1n, "flinty" v. lt. sl. pinkish- to sl. greenish-gray; comm. cut by vnits of gtz, ep, act, ± in various combinations
— Not a positive RX I.D.; could also be silicified mds.
✓ THIN SECTION

~20% ?
ss, v fgr-fgr, ~~s~~ to ~~s~~
bone white, buff white, v. lt. gray buff v. lt. sl. grnsh-gray; argill., permissibly tuffaceous
©

~32% ?
MDS and muddy slts. lt-med gray to sl. greenish-gray; dense, well-indurated. comm. translucent.
©

0.1 pyrite
Tr. cpy 0.5AC
Tr. bn
1 EP



Tremolite/actinolite vein fragment: translucent v. lt. greenish-gray but clearly fibrous and shredding.
- At least at one time this fragment implies a fracture aperture of at least 2 mm.

7780-7790'

conspicuous and abundant, loose euhedral EP ± AC * crystal porous aggregates imply considerable open space.
* pyrrhotite appears

(11) Tr — EP AC QTZ

(4) VVE
ep, act, qtz, cpy, po

(25) ~~PROBABLE~~ RHYOLITE
dense, flinty, porcellaneous to microsaccharoidal; opaque to translucent (feebly); pinkish-white to v. lt. pinkish-gray; commonly tinged w/ gray-green

This rock superficially resembles silicified mudstone, but with the right lighting angle microlites of feldspar become apparent.

(23%) SCALE aa

% type	
A.1-2	
A.2-7	
A.3-2	
A.4-5	
A.5-4	
A.6-Tr	
A.7-Tr	
A.8-3	
	23

(3) (possibly more) silicified gouge
(66) and cataclasite (tectonic crush vBX)
vague foliation
some ~~bx~~ chips
SS PROTOLITH

(23) ss vfg-fgr aa but mostly ~~o~~ & mostly bright bone white.
intense silicification
Tr chitzn.

(26) MUDSTONE & muddy slts, aa, dom. v. lt-lt. gray & grnsh-gray — strongly silicified

5 EP
3 AC
0.3 py

0.1 cpy
Tr. bn

** NOTE: VEINLETS IN CHIPS DEFINITELY CONCENTRATED IN RHYOLITE

Logging Notes

ELMORE-IW3 RD
09/09/03 J. Hulen

7790-7800'

5 EP, 3 AC, 0.1 cpy, Tr. py

(19) SCALE - same types as described for 7570-7580'

(5) VVF
- ep
- ac
- qtz
- cpy

(3) CATACLASITE (crush bx) & GOUGE (poss. more) highly silicified; some chips vaguely shear-foliated. GG

~25 SS, vfg-fg, mostly some ... ; mostly bright bone-white to buff-white

~23 MDS & muddy slts, aa. lt. gray to grnsh-gray; comm. silicified comm. transl.

~25 RHY, aa [see description 7780-7790']

** Note: As in the overlying sample, veins in rock chips are concentrated in the rhyolite.

7800-7810'

[ep, act, cpy, py, qtz]

(12) SCALE aa

(30) RHY, aa; flinty ~saccharoidal, v. lt. pinkish to sl. greenish-gray & pinkish-white.

(6) VVF [poss. more]
- Loose, porous aggregates of 0.1-0.7 mm ≤1.3 mm prismatic ep & acicular/fibrous actinolite ± qtz, tr. S=
- veinlets cutting rock chips 20µ - 0.3 mm. wide - sharp straight margins. act >> ep >> qtz > S=

mostly in rhy

GG & cataclasite (2) aa, poss. more.

(15) SS, vfg, aa silicfd, etc

(35) MDS & muddy slts, extensively silicified; lighter gray chip closely approximate rhyolite in appearance

0.5 cpy, 0.2 bn, Tr. PO, 0.3 py, 4 AC, 5 EP

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Abundant Veinlets & Vn.lt. Frags.

7810-7820'

(15) SCALE aa

(10) VVE, aa [poss. more] mostly EP & ACT, lesser qtz & s=

(3) GG & cataclasite aa [poss. more]

(19) RHY aa

(30) MDS & SLTS, aa dom. lt. gray, ext. silici-fied

(23) SS, vfg-fg, extensively silicified mostly

9 EP
6 AC
0.1 PO
0.7 cpy
0.5 py
0.1 bn

7820-7830'

(7) SCALE aa

(2.5) VVE aa

(0.5) GG & cataclasite aa

(11) RHY aa

(25) MDS & muddy slts, aa extensive-ly silici-fied

(54) SS, vfg-fg, to extensively silicified mostly buff-white to v. lt translucent gray speckled w/ yell.-green [ep]

7 EP
2 AC
0.3 cpy
0.2 bn
0.3 py

7830-7840'

(9) SCALE aa

(2) VVF aa

(1.5) GG & cataclasite aa

(Tr) PBX (dilational, or jigsaw-puzzle microbreccia)

(~30) RHY aa

(20.5) MDS & muddy slts, aa (silicfd)

(~37) SS, aa vfg-fg (silicfd.

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Logging Notes

ELMORE-IW3, RD

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7640-7650'

⑥ SCALE [cvd] → multiple types as described for 7570-7580' [page 1]

EP, AC ③ VVF → loose, discrete aggregates, up to 1.5 mm in dia, composed of euhedral prismatic epidote x/s. & euh. acicular to fibrous lt. gray-green tremolite/actinolite ± qtz. & sulfides. Also: more solid (less porous) vnlts of the same minerals cutting various rock chips.

① tr.

4 EP
1.5 AC
0.5 CPY
0.2 BN
0.5 PY

** VEINLETS ARE CONCENTRATED IN RHYOLITE CHIPS

① (possibly more) GG & CATACLASITE (crush microbreccia); comm. vaguely foliated; altd. to same assemblage as VVF but w/more silica — also chl. & ser. bright bone white to lt. grnish-gray

(45) RHYOLITE (intrusive), msv, vxln-saccharoidal to aphanitic-porcellaneous; bright bone-white to pinkish- to buff-white, locally tinged with lt. gray-green; (flinty) appearance v. similar in appearance to co-existing silicified mudstone but only the latter is "micro-~~spk~~ speckled with leucoxene. A few chips show vague flow-banding.

(30) SS, vfg to ~~lg~~ colors as above; extensively silicfd. & epidotized ± act.

(15) MDS & muddy silts., aa. extensive silicification

7850-7860'

④ SCALE, aa [cvd]

① GG, aa

50 RHY, aa

27 SS, aa

15 MDS, aa

0.7 cpy
0.4 bn
0.3 py
2 ~~ep~~ (act.)
5 EP

str. silicif.

③ → ~~23~~ VVF, aa
ep, ac, qtz, py, bn, cpy

7860-7870'

④ SCALE aa | ① GG, aa | ② VVF aa | 19 MDS aa

43 RHY, aa | 31 SS, aa

M-S silicf.

0.7 cpy
0.3 bn
0.3 py
4 EP
1.5 AC

7870-7880'

3 rust

③ SCALE aa | 0.5 GG, aa | ② VVF aa | 20.5 MDS, aa

u 21 RHY, aa
?

53 SS, aa

S silicif.

6 EP
1 AC
0.3 BN
0.3 PY
0.5 cpy

7880-7890'

3 rust & steel

② SCALE aa | 0.5 GG aa | ② VVF aa maybe more | 21.5 MDS aa

17 RHY aa | 57 SS aa

S silicif.

2 EP 0.7 cpy
1 AC 0.4 bn
0.5 py

FIN (TD)

EPOCH WELL LOGGING, INC.

Bakersfield, CA
(805) 397-7472
Ventura, CA
(805) 658-7708
Anchorage, AK
(907) 561-2465
Houston, TX
(713) 759-1021

Geothermal Presentation

- [x] *Formation Log*
- [ ] *Drilling Dynamics Log*
- [ ]

DRILLING COPY
DO NOT REMOVE

LOG INTERVAL

DEPTHS:	7572'	TO	7889'
DATES:	7/5/97	TO	7/7/97
SCALE:	2" = 100'		

CASING DATA

24"	AT	486'
18 5/8"	AT	1935'
9 5/8"	AT	2726'
10 3/4"	AT	4023'

MUD TYPES

GEL/PAC/DESCO	TO	7889'
	TO	
	TO	
	TO	

HOLE SIZE

8 1/2"	TO	7889'
	TO	
	TO	
	TO	

COMPANY:	CAL ENERGY
WELL:	ELMORE IW-3
FIELD:	SALTON SEA
REGION:	IMPERIAL VALLEY
COORDINATES:	2955'N, 5108'E
	SE/NE S34, T11S, R13E
ELEVATION:	G.L. = -225'
	K.B. = -198'
County/State:	IMPERIAL, CA
API Index:	
Spud Date:	9/22/88 (ORIGINAL)
Contractor:	C & L
Co. Rep.:	SHELDON HOPKINS
Rig/Type:	LAND/TRIPLE
Logging Unit:	9
Geologists:	STEVE HARNER

ABBREVIATIONS

NB	*NEWBIT*	**MW**	*MUD WEIGHT*	**PR**	*POOR RETURNS*
RRB	*RERUN BIT*	**VIS**	*FUNNEL VISCOSITY*	**LC**	*LOST CIRC.*
CB	*CORE BIT*	**PV**	*PLASTIC VISCOSITY*	**CO**	*CIRCULATE OUT*
TG	*TRIP GAS*	**YP**	*YIELD POINT*		
SG	*SURVEY GAS*	**FL**	*FLUID LOSS*		
WG	*WIPER GAS*	**CL**	*PPM CHLORIDE ION*		
CG	*CONNECTION GAS*	**Rm**	*MUD RESISTIVITY*		
WOB	*WEIGHT ON BIT*	**Rmf**	*FILTRATE RESISTIVITY*		
RPM	*ROTARY REV/MIN*	**LAT**	*LOGGED AFTER TRIP*		
PP	*PUMP PRESSURE*	**LAS**	*LOGGED AFTER SURVEY*		
SPM	*STROKES/MIN*	**NR**	*NO RETURNS*		

MINERAL PERCENTAGE

< 1%	1-3%	4-6%	7-9%	> 10%

SAND	CONGLOMERATE	GABBRO
SANDSTONE	CARBONATES	VOLCANICS
SHALE	BASALT	VOL-CLASTIC SEDS
SILTSTONE	ANDESITE	TUFF/ASH
CLAYSTONE	DACITE	METAMORPHICS
CLAY	RHYOLITE	CEMENT CONTAM.
CHERT	GRANITIC RX	

ALTERATION - TYPE

SERICITIZATION	BIOTITIC
SILICIFICATION	CHLORITIC
	KAOLINITIC

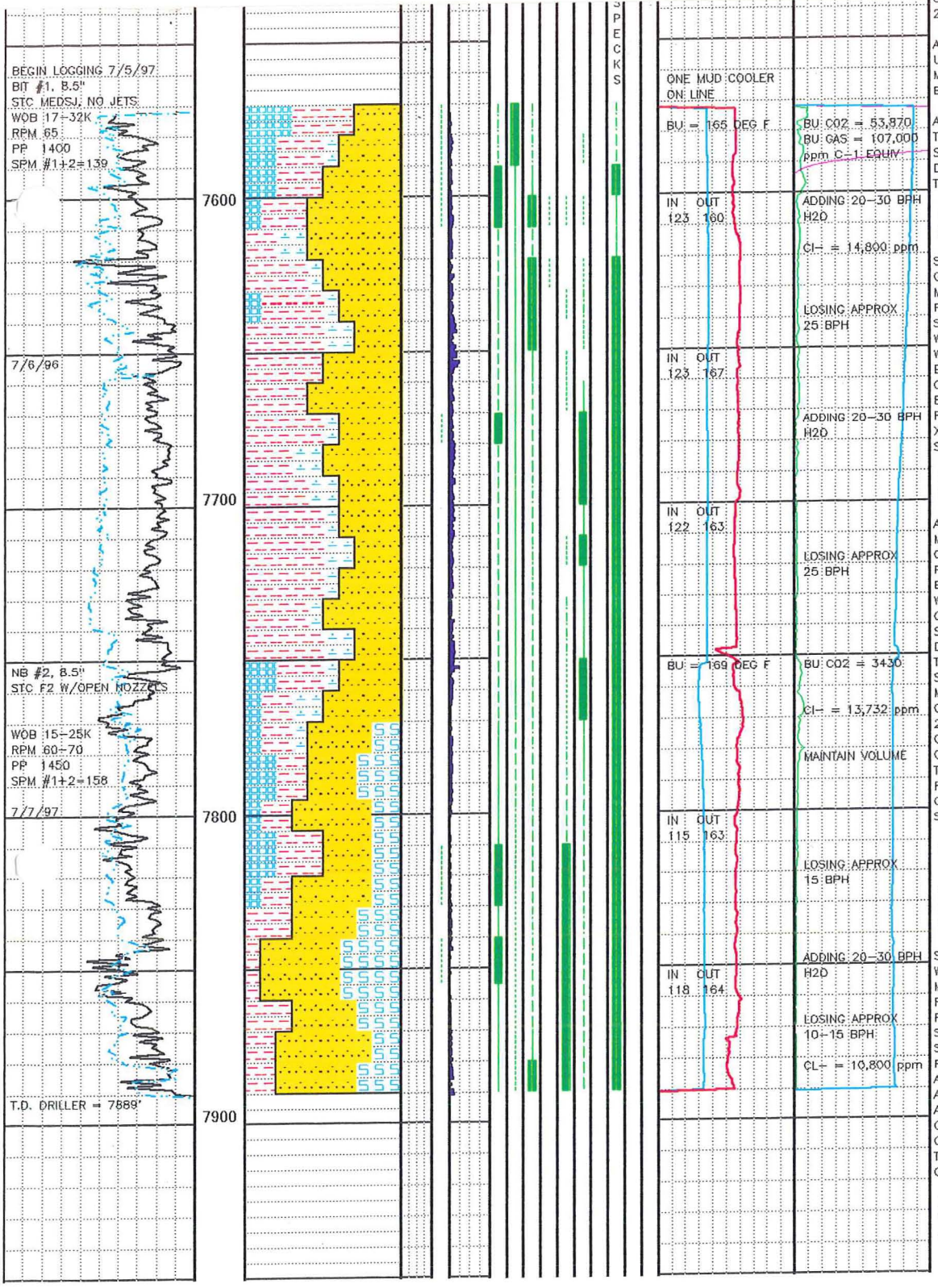
ALTERATION - INTENSITY

WEAK	MODERATE	STRONG

EPOCH WELL LOGGING, INC.

Company : CAL ENERGY   Well : ELMORE IW3   Location : SALTON SEA, CA   Date : 7/5/97   Page No.: 1

PENETRATION	DEPTH	LITHOLOGY	% Returns	FRACTURES	Mud Loss	MINERALS	ALTERATION	TEMPERATURE	RETURNS	REMARKS
<50 ROP 0> (ft/hr) <50 WOB 0> (klbs)		CUTTINGS PERCENTAGE (0-100)			<50> (bbl/ft)	quartz, calcite, pyrite, hematite, epidote, chlorite, anhydrite, Sulfide, WHITE		<50 T-In 250> <50 T-Out 250> (degrees F) <0 P-In 10> <0 P-Out 10> (psi)	<0 CO2 50K> <0 H2S 10> <0 Gas 2K> (ppm) <0 Pit Vol 750> (bbls)	Lithology Descriptions, Mud Reports, Survey Data, Other Information
	7500									GAS DETECTION EQUIPMENT CALIBRATED TO SPWLA STANDARDS. CONNECTION, SURVEY, WIPER AND CARBIDE GASES REPORTED AS VALUE ABOVE BACKGROUND GAS. TRIP GAS REPORTED AS TOTAL. CO2 AND H2S DETECTION EQUIPMENT IS CALIBRATED BY USE OF KNOWN



2% = 100 UNITS = 20,000 PPM.

ALL CARBIDES ARE APPROXIMATELY 500 GRAMS UNLESS OTHERWISE NOTED. ALL DEPTHS ARE MEASURED FROM THE KELLY BUSHING AND BASED ON THE DRILLER'S PIPE TALLY.

ALL LITHOLOGY COLORS ARE REFERENCED TO THE GSA ROCK COLOR CHART. GRAIN SIZE, SORTING AND DEGREE OF ROUNDNESS ARE DETERMINED THROUGH DIRECT COMPARISON TO A GEOLOGICAL STANDARDS GUIDE CARD.

NOTE = TRACE CLR 2NDRY EUHEDRAL CALCITE AND DRUSY QTZ IN SAMPLES F/7572'-7600'.

SULFIDE RICH SANDSTONE = V LT GRY TO GRYISH WHT; LOWER V FN TO UPPER FN W/OCC MED; HARD TO V FIRM, NONFRIABLE TO FRIABLE W/EFFORT; RICHLY CALC AND MOD SILIC; MOSTLY TRANSLU, CLR AND MLKY QTZ W/FELDSPATHICS AND 2NDRY SULFIDES; MOD WELL SORT, ANG TO SBRND, MOD SPHER; COM BORNITE/CHALCOPYR/PYR; OCC ARSENOPYRITE; OCC NATIVE COPPER; TR SPHALERITE; TR EPIDOTE; COM CHLORITE @ 7665'; COM WHT FELDSPATHIC SPECKS; TR CLR EUHEDRAL QTZ XTLS AND CALC FILLED MICROFRACS; OCC SILIC BRINE SCALE.

NOTE = ADDING 4 SACKS PER HOUR COTTON SEED HULLS TO MUD, SAMPLE QUALITY POOR.

ALTERED SPECKLED CLAYSTONE = LT GRY TO MOD DK GRY & YELISH GRN TO DUSKY YELISH GRN; ABUND DISSEM LT GRYISH WHT TO WHT FELDSPATHIC SPECKLES; HARD TO V HARD; BRITTLE, SHARP EDGED, PLATY, TAB AND WEDGELIKE CTGS; SMOOTH TO MATTE AND FNLY GRAINY; DULL TO RESINOUS W/SCAT MICRO-SPARKLES TO VAGUE TRANSLUCENCY; MOD-COM DISSEM CRYPTOXTLN TO MICROXTLN CALC; MOD TO V SILIC; APPEARS "TUFFACEOUS" AND SIGNIFICANTLY ALTERED TO THE POINT THAT MOST OF ITS ORIGINAL DEPOSITIONAL CHARACTERISTICS HAVE BEEN OBSCURED BY 2NDRY MINERALIZATION; COM CLR PALE YEL GRN SUBHEDRAL EPIDOTE; SCAT BORNITE/CHALCOPYR; OCC NATIVE COPPER; TR CLR TO TRNSLU SILKY WHT AND V PALE GRNISH WHT FIBROUS SERPENTINE/CHRYSOTILE NEEDLES; OCC ARSENOPYRITE; COM SILICEOUS BRINE SCALE; TR MINERALIZED MICROFRACS.

CARBIDE LAG @ 7800' = 58 MIN @ 158 SPM 17 UNITS, 12 MIN DUR, 121% THEORETICAL

MW 9.3 VIS 40 PV 12 YP 7 GELS 0/9 FL 13.4 CT 2 SOL 6.7 SD 0.25 pH 8.0 Cl- 9000 Ca 520

SILICIFIED ROCKS = V LT GRY TO GRYISH WHT AND PALE YELISH GRN; HARD TO V FIRM; MOSTLY BRITTLE, SHARP EDGED, HACKLY, PLATY AND WEDGELIKE CTGS; FAIRLY DULL TO RESINOUS, SBVIT AND VAGUELY TRANSLUCENT; SMOOTH TO FINELY GRAINY; VARIABLE SPECKLING AND MOTTLING; OCC POORLY PRESERVED MICROLAMS; "ORIGINAL LITHOLOGY APPEARS TO BE BOTH FN GRAINED SANDSTONE AND TUFFACEOUS CLAYSTONE/MUDSTONE"; ABUND YELISH GRN EPIDOTE; ABUND BORNITE/CHALCOPYR; OCC ARSENOPYR; OCC NATIVE COPPER; OCC SILKY PALE GRN TO WHT SERP/TALC; OCC SILIC SCALE; WEAK TO NONCALC; OCC MINERALIZED MICROFRACS.

NOTE = T.D. DRILLER @ 7889'. CIRC AND WIPE HOLE. CHANGE OVER TO BRINE AND AND FLOW TEST WELL.