

Appendix 1: Origin and mineralogy of Texas samples used in this study and number of FIB sections studied in them. Notes: * Bottom-hole corrected data; † F: Frio fault zone, W: Wilcox fault zone.

County	Well	Depth (m)	Temp.* (°C)	Pressure* (bars)	Fault Area†	Formations	Age	FIB sections	Quartz	Illite	Chlorite	Kaolinite	Feldspar	Oxides	Carbonates
Kleberg	Alazan #159	2813	102	300	F	Frio	Oligocene	2	•••••	••	•	-	•	•	•
Nueces	TST 470#4	3267	121	590	F	Frio	Oligocene	1	•••••	••	•	-	-	•	•
Nueces	Cecelia Kelly #2	3604	129	660	F	Frio	Oligocene	2	••••	••	•	-	•	•	••
Nueces	Cecelia Kelly #2	3717	135	690	F	Frio	Oligocene	2	••••	•	•	-	•	••	••
Kleberg	Lavon #1	4133	149	850	F	Vicksburg	Oligocene	2	•••••	••	••	•	-	-	-
Nueces	TST 346#1	4420	166	800	F	Vicksburg	Oligocene	2	•••••	••	•	-	•	•	•
Nueces	TST 346#1	4429	166	800	F	Vicksburg	Oligocene	2	•••••	•	•	•	•	•	•
Live Oak	Clay West #1	4352	191	750	W	Navarro	Upper Cretaceous	2	•••••	••	•	-	•	•	•
McMullen	Washburn R C #1	5427	191	1050	W	Glen Rose	Lower Cretaceous	3	•••••	••	••	•	-	-	-
McMullen	Franklin #1	5775	204	1150	W	Glen Rose	Lower Cretaceous	2	•••••	••	••	•	-	-	-
McMullen	Alamo #1	5825	216	1150	W	Glen Rose	Lower Cretaceous	2	••••	•	•	-	•	••	••
McMullen	Alamo #1	6313	232	1200	W	Glen Rose	Lower Cretaceous	1	•••	•	•	-	•	••	•••

9 **Appendix 2:** TEM-EDX analyses of Gulf Coast chlorites (crystal rims analyses) used to test thermometers. All iron is considered as ferrous.

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	AZ#159 - 9230				ST#470-4 - 10717			CK#2 - 11924			CK#2 - 12196			
	chl10	chl17	chl30	chl28	chl27	chl29	chl30	chl47	chl50	chl54	chl20	chl18	chl19	chl21
T°C	102	102	102	102	121	121	121	129	129	129	135	135	135	135
SiO ₂	32.68	32.37	32.04	31.37	32.59	34.47	32.37	31.99	31.49	31.27	32.15	33.26	32.93	32.87
TiO ₂	0.14	0.06	0.00	0.00	0.07	0.03	0.14	0.19	0.10	0.00	0.05	0.28	0.14	0.00
Al ₂ O ₃	25.69	25.69	25.34	26.19	22.92	23.86	25.29	26.55	27.48	26.02	26.24	26.17	26.91	25.91
FeO	28.65	28.77	30.40	31.75	35.57	32.88	32.60	31.69	30.84	32.49	31.81	31.02	31.02	31.07
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.16	12.57	11.67	10.06	8.19	8.01	8.80	8.56	9.55	9.29	9.75	8.66	8.76	9.44
CaO	0.28	0.07	0.05	0.00	0.10	0.03	0.27	0.12	0.00	0.09	0.00	0.37	0.11	0.11
Na ₂ O	0.00	0.00	0.04	0.24	0.00	0.14	0.00	0.27	0.00	0.21	0.00	0.00	0.00	0.00
K ₂ O	0.40	0.47	0.47	0.39	0.57	0.58	0.53	0.61	0.53	0.62	0.00	0.25	0.07	0.66

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	LA#1 - 13559				ST#356-1 - 14501		CW#1 - 14277				WR#C1 - 17805		
	chl23	chl20	chl11	chl17	chl36	chl34	chl13	chl14	chl32	chl31	chl13	chl18	chl16
T°C	149	149	149	149	166	166	191	191	191	191	191	191	191
SiO ₂	29.63	29.27	29.00	28.56	31.31	29.79	28.58	28.01	27.67	27.38	32.48	32.26	31.33
TiO ₂	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.22	0.09	0.09	0.03	0.00	0.05
Al ₂ O ₃	25.44	25.41	25.58	26.78	26.69	27.97	30.60	28.57	28.73	28.39	27.69	26.79	27.05
FeO	40.44	41.24	41.75	40.32	27.02	27.19	34.14	37.35	37.50	37.58	30.94	31.06	32.08
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	3.63	3.28	3.25	3.40	14.53	14.59	5.84	5.53	5.60	5.96	7.92	9.20	9.25
CaO	0.15	0.03	0.13	0.30	0.00	0.00	0.51	0.00	0.02	0.35	0.12	0.21	0.00
Na ₂ O	0.47	0.46	0.00	0.31	0.16	0.00	0.00	0.00	0.38	0.00	0.55	0.02	0.06
K ₂ O	0.24	0.32	0.29	0.33	0.28	0.40	0.33	0.32	0.00	0.25	0.28	0.46	0.17

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	FR#1 - 18946				AL#1 - 19110				AL#1 - 20711		
	chl26	chl30	chl28	chl29	chl17	chl18	chl27	chl25	chl31	chl28	chl29
T°C	204	204	204	204	216	216	216	216	232	232	232
SiO ₂	31.71	31.49	31.42	30.93	28.61	28.29	28.59	28.07	31.03	30.06	29.71
TiO ₂	0.00	0.07	0.08	0.20	0.04	0.00	0.00	0.07	0.21	0.00	0.00
Al ₂ O ₃	24.73	24.35	24.19	24.45	29.35	29.13	28.58	28.83	22.60	23.02	23.34
FeO	26.51	27.31	27.16	28.05	31.80	32.38	31.28	31.40	34.64	36.84	36.60
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	16.60	16.07	16.37	15.44	9.96	9.47	10.73	11.20	10.62	9.53	9.50
CaO	0.00	0.19	0.13	0.09	0.14	0.15	0.15	0.00	0.00	0.00	0.04
Na ₂ O	0.00	0.00	0.00	0.24	0.00	0.00	0.27	0.00	0.21	0.01	0.23
K ₂ O	0.45	0.52	0.65	0.61	0.10	0.58	0.40	0.43	0.68	0.55	0.58

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15 **Appendix 3:** TEM-EDX analyses of Gulf Coast illites (crystal rims analyses) used to test thermometers. All iron is considered as ferrous.

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	AZ#159 - 9230			ST#470-4 - 10717			CK#2 - 12196			LA#1 - 13559			
	m18	m42	m43	m27	m26	m24	m22	m23	m24	m30	m37	m39	m31
T°C	102	102	102	121	121	121	135	135	135	149	149	149	149
SiO ₂	54.98	54.98	54.87	62.04	61.23	61.46	59.40	58.47	55.79	54.57	51.71	52.95	55.79
TiO ₂	0.15	0.35	0.16	0.03	0.22	0.31	0.35	0.26	0.26	0.35	0.39	0.51	0.38
Al ₂ O ₃	32.85	34.42	34.26	25.33	25.94	23.97	29.77	30.21	32.59	31.55	32.36	32.55	31.28
FeO	3.31	1.49	1.32	3.40	3.18	3.87	1.98	1.67	2.00	2.12	3.59	2.87	2.17
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.02	0.00
MgO	1.68	1.16	1.22	2.85	2.86	3.47	2.10	1.80	1.47	1.96	3.04	2.32	2.44
CaO	0.00	0.23	0.00	1.07	0.86	0.89	0.00	0.00	0.00	0.00	0.00	0.09	0.00
Na ₂ O	0.00	0.14	0.32	0.31	0.06	0.28	0.26	0.30	0.24	0.00	0.13	0.16	0.45
K ₂ O	7.03	7.24	7.85	4.97	5.66	5.74	6.14	7.21	7.65	9.44	8.78	8.52	7.49

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	ST#356-1 - 14501				CW#1 - 14277	WR#C1 - 17805				FR#1 - 18946			
	m47	m14	m46	m13	m2	m27	m35	m33	m31	m6	m4	m5	m3
T°C	166	166	166	166	191	191	191	191	191	204	204	204	204
SiO ₂	54.44	50.27	51.51	49.27	56.43	54.83	54.23	52.22	52.67	52.40	51.89	52.75	51.25
TiO ₂	0.38	0.15	0.61	0.33	0.00	0.72	0.70	0.68	0.87	0.36	0.41	0.45	0.51
Al ₂ O ₃	32.33	36.66	34.39	37.07	34.37	27.32	27.80	27.24	27.81	29.32	29.26	28.48	29.70
FeO	3.14	3.37	2.66	2.98	2.66	5.20	5.28	6.44	5.53	4.78	5.06	4.69	4.80
MnO	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.15	1.58	1.53	1.54	0.66	2.77	2.64	3.18	2.75	2.83	2.62	2.80	2.82
CaO	0.00	0.00	0.01	0.00	0.28	0.05	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Na ₂ O	0.64	0.07	0.62	0.00	0.40	0.54	0.35	0.00	0.20	0.14	0.00	0.38	0.00
K ₂ O	6.92	7.89	8.67	8.77	5.20	8.57	9.00	10.23	10.18	10.16	10.64	10.45	10.92

	AL#1 - 19110				AL#1 - 20711		
	m34	m38	m36	m35	m22	m39	m33
T°C	216	216	216	216	232	232	232
SiO ₂	50.04	50.13	50.31	49.63	55.29	55.34	53.22
TiO ₂	0.01	0.00	0.08	0.16	0.51	0.14	0.55
Al ₂ O ₃	34.12	33.57	33.64	34.36	27.30	31.45	29.43
FeO	5.60	6.14	5.66	5.93	4.99	1.71	3.84
MnO	0.04	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.53	1.61	1.47	1.31	2.36	2.00	2.08
CaO	0.00	0.38	0.00	0.00	0.02	0.00	0.00
Na ₂ O	0.00	0.36	0.61	0.71	0.00	0.00	0.00
K ₂ O	8.66	7.82	8.24	7.89	9.55	9.37	10.88