

TABLE 3. *Chemical and physical tests of clay and associated minerals, south Texas area.*
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Evaluations of the data concerning each sample have been studied from the point of view of the possible utilization of these clays in one or more of the following industries:

- (1) Paper: filler and coating clays

(2) Ceramics: structural, non-structural, and refractory

(3) Lightweight concrete aggregate

(4) Mineral wool

(5) Drilling mud

(6) Decolorizing of oil
- (7) Oil-absorbing floor sweep

(8) Filler (for rubber, etc.)

(9) Insecticide (carrier and diluent)

(10) Pozzolan aggregate for concrete

(11) Cement: component in Portland cement manufacture

	ATASCOSA COUNTY			BEE COUNTY			CAMERON COUNTY										
Min. Tech. Lab. No.	60087	60093	60145	60310	60311	60312	60250	60251	60252	60253	60254	60255	60256	60257	60258	60259	60260
Field locality No. ^a	1	4	4C	2	3	5	1A	1B	2	3	4	5	6	7	8	9	10
Free lime (carbonates)	Positive	Negative	Negative	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Benidine test	Negative	Negative	Negative	Very slight blue	Slight blue	Slight bluish-gray	Faint blue	Faint blue	Faint blue	Negative	Slight blue	Slight blue	Faint blue	Faint blue	Faint blue	Negative	Very faint blue
Color (air-dried)	Tan	Dark brown	Dark brown	Light tan	Dark cream	Light buff	Tan	Tan	Gray	Tan	Tan	Tan	Light tan	Tan	Tan	Tan	Light tan
Oil absorption— Calcline 450°C	---	34	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Air-dried	Medium	57	50	42	Medium	Fast	Slow	Slow	Fast	Slow	Fast	Fast	Slow	Medium	Fast	Fast	Fast
Moisture (H ₂ O-) (%)	3.00	4.12	3.94	5.55	4.49	3.45	5.58	4.35	5.01	4.22	5.88	5.47	5.78	5.70	2.90	4.60	3.90
Ignition loss— 300–600°C (%)	1.92	7.97	13.78	2.46	3.86	3.25	8.20	6.94	5.62	8.81	10.49	11.11	4.72	5.81	7.57	5.65	7.13
105–1050°C (%)	4.64	19.81	19.27	6.04	11.89	12.10	12.81	15.21	9.55	14.50	15.17	15.24	15.92	13.69	14.35	13.52	16.55
Water of plasticity (Atterberg test)— Average (%)	42	52	57	102	57	53	59	66	60	47	68	64	72	67	40	62	61
Difference (%)	30	40	60	122	52	63	68	69	51	41	88	77	91	86	46	64	63
Swelling test (percent increase in volume)— In distilled water	0	43	88	165	105	126	183	209	86	25	96	88	83	121	65	87	113
In salt water	0	29	50	130	57	68	61	0	50	29	40	63	79	63	27	61	75
Slaking test (–100 mesh) (%)	26	5	<5	<5	7	26	52	99.4	23	30	43	30	33	42	74	16	18
Bloating test: 10 minutes at— 2000°F	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2200°F	---	---	---	---	---	---	---	---	Negative	---	---	---	---	---	Negative	---	---
2400°F	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Yield of 15 cp. drilling mud (bbl. per ton)— Untreated	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Treated with soda ash	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
pH value	8.4	5.9	6.9	53 9.0	9.2	9.7	8.9	Very low 9.5	9.2	8.8	8.8	8.6	Low 8.9	9.2	8.9	8.4	8.8
Decolorizing efficiency compared to AOCS official clays— Natural with natural (%)	---	---	---	41	---	---	---	---	---	---	---	---	---	---	---	---	---
Activated with activated (%)	---	---	---	50	---	---	---	---	---	---	---	---	---	---	---	---	---
Firing test— Powder—2200°F (1204°C)	Brown Steel hard	Dark cream Sintered friable	Light buff Sintered	Dark gray Bloated	Buff Fused	Buff Fused	Buff Vitrified	Buff <Steel hard	Tan Fused	Brown Fused	Buff Vitrified	Buff Vitrified	Buff Vitrified	Buff Fused	Brown Fused	Brown Fused	Brown Fused
2400°F (1316°C)	Brown Steel hard	Buff Sintered	Buff Steel hard	---	---	---	Brown Fused	Brown Fused	---	---	Dark brown Fused	Dark brown Fused	---	---	---	---	---
2600°F (1427°C)	Dark brown Fused	Light buff Steel hard	Tan Vitrified	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Disks, ½-inch diameter— (Approx. cone 02) 2000°F (1093°C)	Brick red +Steel hard	---	---	---	---	---	---	---	Buff Steel hard	---	---	---	---	---	---	---	---
(Approx. cone 7) 2200°F (1204°C)	Dark brown +Steel hard	---	---	---	---	---	---	---	Brown Fused	---	---	---	---	---	---	---	---
(Approx. cone 15) 2600°F (1427°C)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Loss on ignition at— 105–300°C	1.38	10.46	4.37	3.20	2.23	1.56	1.33	0.64	1.11	1.31	1.45	1.74	1.73	1.69	1.15	1.36	1.23
300–450°C	0.32	4.05	9.81	0.55	0.64	0.33	1.33	2.77	2.76	4.42	2.44	5.50	2.89	3.63	4.29	2.19	3.13
450–600°C	1.60	3.92	3.97	1.91	3.22	2.92	4.47	4.17	2.86	4.39	8.05	5.61	1.83	2.18	3.28	2.74	4.00
600–900°C	1.32	1.15	1.03	} 0.38	} 5.80	} 7.29	4.97	} 7.63	} 2.82	} 4.38	} 3.23	} 2.39	} 9.47	} 6.19	} 5.63	} 6.51	} 8.19
900–1050°C	0.02	0.23	0.09				0.37										
Neutralization value as CaCO ₃	3.5	1.0	---	3.9	20.6	22.4	22.8	29.8	17.0	25.6	25.8	---	25.9	22.1	22.2	22.2	31.01

Remarks^b (samples arranged by Min. Tech. Lab. numbers)—

- No. 60087 NIU other than common brick.

No. 60093 NIU. Behaves as a ball clay. The fired color is darker than that required for ceramic whiteware. It might be possible to find a clay with lighter “fired color” in the same deposit. The oil absorbing capacity is low even after calcination.

No. 60145 Contains appreciable organic matter. Low oil absorbing capacity. Not suitable for ceramic whiteware or as refractory material. Should be further tested by a specialized laboratory as a raw material for structural ceramics (brick and tile).

No. 60310 A bentonite capable of yielding 53 barrels of 15-cp drilling mud per ton of clay treated with sodium carbonate. FTR. Low oil absorbing capacity (42%). The oil decolorizing capacity after acid-activation is 50% compared to AOCS official activated earth.

No. 60311 NIU as a clay. A silty calcareous clay containing 20.6% carbonates NV.

No. 60312 NIU as a clay. A silty calcareous clay containing 22.4% carbonates NV.

No. 60250 NIU as a clay. Contains 22.8% carbonates NV.

No. 60251 NIU as a clay. Contains 30.1% carbonates NV.

No. 60252 NIU as a clay ECB. A calcareous clay containing 17.0% carbonates NV.

No. 60253 NIU as a clay. A calcareous clay containing 25.6% carbonates NV.

No. 60254 NIU as a clay. A calcareous clay containing 25.8% carbonates NV.

No. 60255 NIU as a clay. A calcareous clay containing 23.6% carbonates NV.

No. 60256 Low yield of drilling mud. NIU as a clay. Contains 25.9% carbonates NV.

No. 60257 NIU as a clay. A calcareous clay containing 22.1% carbonates NV.

No. 60258 NIU as a clay. A calcareous clay containing 22.2% carbonates NV.

No. 60259 NIU as a clay. A Calcareous clay containing 22.2% carbonates NV.

No. 60260 NIU as a clay. A calcareous clay containing 31.0% carbonates NV.

^a See Plate 2 for location.

^b The following abbreviations are used:

- AOCS=American Oil Chemists' Society.
- FTR=Further testing by a specialized laboratory is recommended.
- NIU=No important industrial (or commercial) use.
- NV=Neutralization value expressed as calcium carbonate.
- ECB=With the possible exception of common brick. Clays containing as high as 20% carbonates have been included in this classification because there are several plants in operation in Texas producing brick from such clays. Normally it is not desirable to use clays containing more than 3% carbonates (U.S. Bureau of Mines Bulletin 565). The presence of excessive carbonates (lime and magnesia) causes undue shrinkage and shortening of the firing range. Closely regulated firing is required to overcome the latter.
- 15-CP=15-centipoise.