

**APPENDIX III-B  
BRAZOS RIVER DRILLING 2005**

**CORE DESCRIPTIONS & CORE PHOTOS**

**WELL MULLINAX-2**

**31°06.55' N, 96°50.28' W**

**Lithology descriptions and core photos by  
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Mullinax-2 and 3 were drilled at the same location a few feet apart as overlapping cores for maximum recovery.

Top of core: 2.44 m (8 feet) subsurface

Base of core: 23.77 m (78 feet)

LINER SECTION 1	2.44 to 3.51 m	(-8 to -11.5 feet)
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2.44–2.90 m		(-8 to -9.5 feet)
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no core

Part 1-1	59 cm of core—2.44 to 2.90 m	(-8 to -9.5 feet)
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0–23 cm

no core

23–38 cm

Mudstone, sandy; light gray, spotted with tan (from alteration); poorly sorted; quartzose grains; thick bedded.

Condition: Broken with pieces rounded and out of place. Some quartzose pebbles (from Quaternary lag deposit) mixed into mass of core pieces. Moderately weathered.

38–59 cm

Mudstone, sandy; light gray, spotted with tan (from alteration); poorly Sorted, quartzose grains, thick bedded, few weathered “pyrite concretions” (now iron oxide masses); secondary gypsum crystals between pieces.

Condition: Partly broken, with some pieces shifted in position and some roughly in place. Moderately weathered. A few small modern roots present.

Part 1-2

60 cm of core—2.90 to 3.51 m (-9.5 to -11.5 feet)

0–16 cm

Mudstone, sandy; light gray, spotted with tan (from alteration); poorly sorted; quartzose grains; thick bedded; secondary gypsum crystals in veins between pieces; gradational basal contact.

Condition: Partly broken, with pieces still in place. Moderately weathered.

16–27 cm

Sandstone, argillaceous and silty; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained; poorly sorted; quartzose; mud matrix between grains; medium bedded; some lamination; sharp basal contact.

Condition: Good, but moderately weathered and some root penetration of modern vegetation.

27–30 cm

Sandstone, calcareous; light tan. Concretion of sandstone with calcareous cement. Sharp basal contact.

Condition: Good.

30–60 cm

Sandstone; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained, with some medium grains; moderately sorted; quartzose; a little mud matrix between grains; thick bedded; some gastropod steinkerns and phosphate

nodules; bioturbated (lamination lacking); some iron oxide-replaced pyrite masses; some thin veins of gypsum.

Condition: Good.

End of core section.

LINER SECTION 2                      3.51 to 4.11 m depth                      (-11.5 to -13.5 feet)

Part 2-1                                  61 cm of core—3.51 to 4.11 m depth                      (-11.5 to -13.5 feet)

0–15 cm

No core

15–25 cm

Sandstone; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained, with some medium grains; moderately sorted; quartzose; a little mud matrix between grains; thick bedded; gradational basal contact.

Condition: Broken into pieces, with pieces roughly in place.

25–61 cm

Sandstone; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained, with some medium grains; moderately sorted; quartzose; a little mud matrix between grains; thick bedded; a few scattered fossil fragments and benthic forams; some gastropod steinkerns and phosphate nodules; bioturbated (lamination lacking); some iron oxide-replaced pyrite masses.

Condition: Good, but weathered.

LINER SECTION 3                      4.11 to 5.64 m depth                      (-13.5 to -18.5 feet)

Part 3-1                                      35 cm of core—4.11 to 4.42 m depth                      (-13.5 to -14.5 feet)

0–35 cm

Sandstone; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained, with some medium grains; moderately sorted; quartzose; a little mud matrix between grains; thick bedded; a few scattered fossil fragments; some gastropod steinkerns and phosphate nodules; bioturbated (lamination lacking); some iron oxide-replaced pyrite masses.

Condition: Good, but weathered.

Part 3-2                                      60 cm of core—4.42 to 5.03 m depth                      (-14.5 to -16.5 feet)

0–33 cm

Sandstone; light brown, speckled appearance with common dark grains (pepper & salt appearance); fine grained, with some medium grains; moderately sorted; quartzose; a little mud matrix between grains; thick bedded; a few scattered fossil fragments; some gastropod steinkerns and phosphate nodules; bioturbated (lamination lacking); some iron oxide-replaced pyrite masses; gradational basal contact, due to crustacean burrowing carrying sand down into the mud.

Condition: Good, but weathered.

33–50 cm

Mudstone, silty; light brown, with some darker areas that are less oxidized and lighter where sand lenses occur; contains (interbedded with) distinct lenses of sand, up to 4 cm thick embedded in silty mudstone; sands fine grained and moderately sorted; thick bedded, with no apparent lamination; common large diameter (*Thalassinoides*) sand-filled burrows; gradational basal contact.

Condition: good, but weathered.

50–60 cm

Mudstone, silty; light brown, with darker areas that are less oxidized; thick bedded, with no apparent lamination; some large diameter (*Thalassinoides*) sand-filled burrows.

Condition good, but weathered.

Part 3-3                      60 cm of core—5.03 to 5.64 m depth                      (-16.5 to -18.5 feet)

0–60 cm

Mudstone, silty; light to dark brown, getting darker downward, with light and dark streaks from alteration; large 3 cm diameter *Thalassinoides* sand-filled burrow at 14 cm level; massive bedding; a few small fossils and fossil fragments in lower part; several gypsum-filled veins.

Condition: Good, but weathered, with lowest 10 cm less leached.

End of core section.

LINER SECTION 4                      5.64 to 7.32 m depth                      (-18.5 to -24 feet)

Part 4-1                      60 cm of core—5.64 to 6.40 m depth                      (-18.5 to -21 feet)

30 cm

no core

0–30 cm

Mudstone, silty; medium gray; a few small fossils and fossil fragments.

Condition: Broken into pieces and displaced; not in position. Some core lost in interval.

30–60 cm

Conglomeratic mudstone; light brown, with one dark gray area in larger mudstone clast; mudstone clasts of pebble to cobble size; matrix of mud and granules, containing fish bone and some reworked phosphatic clasts; some iron-oxide replaced pyrite masses; much secondary gypsum embedded in matrix.

Condition: Good sample, but altered mineral composition due to weathering and precipitation of gypsum in matrix. Mudstone clasts moderately well preserved.

Part 4-2                      60 cm of core—6.40 to 7.01 m depth                      (-21 to -23 feet)

0–40 cm

Root zone, light brown, with some dark gray area in larger mudstone clasts; mudstone clasts to 4 cm size; matrix of mud and granules, containing fish bone and some reworked phosphatic clasts; some small fossils and fossil fragments, in matrix and in clasts; some iron-oxide replaced pyrite masses; much secondary gypsum embedded in matrix; sharp basal contact.

Condition: Good sample, but altered mineral composition due to weathering and precipitation of gypsum in matrix. Mudstone clasts moderately well preserved.

40–60 cm

Mudstone; light brown and medium gray, in patchy pattern with some non-oxidized gray areas; massive bedded; some scattered small fossils; some small gypsum-filled fractures.

Condition: Good, except for some weathering, with oxidation and leaching, and some gypsum-filled veins.

Part 4-3                      33 cm of core—7.01 to 7.32 m depth                      (-23 to -24 feet)

0–33 cm

Mudstone; light brown and medium gray, in patchy pattern with non-oxidized gray areas dominant in lower part; massive bedded; some scattered small fossils; some gypsum-filled fractures.

Condition: Good, except for some weathering, with oxidation and leaching, and some gypsum-filled veins.

LINER SECTION 5                      7.32 to 8.69 m depth                      (-24 to -28.5 feet)

Part 5-1                                  27 cm of core—7.32 to 7.47 m depth                      (-24 to -24.5 feet)

0–16 cm

no core

16–27 cm

Mudstone; dark gray; massive bedding; some small fossils.

Condition good, except for some breakage.

Part 5-2                                  60 cm of core—7.47 to 8.08 m depth                      (-24.5 to -26.5 feet)

0–60 cm

Mudstone; dark gray; massive bedding; no apparent lamination; scattered small and large fossils.

Condition: Good.

Part 5-3                                  60 cm of core—8.08 to 8.69 m depth                      (-26.5 to -28.5 feet)

0–40 cm

Mudstone; dark gray; massive bedding; only vague lamination; scattered small and large fossils; a few sand-filled burrows; gradational basal contact.

Condition: good.

40–60 cm

Mudstone, silty and sandy; dark gray; massive bedding; minor lamination; some thin sandy layers, with shell concentrates; scattered small and large fossils; some sand-filled burrows; some tiny framboidal pyrite.

Condition: Good.

LINER SECTION 6                      8.69 to 9.91 m depth                      (-28.5 to -32.5 feet)

Part 6-1                      60 cm of core—8.69 to 9.30 m depth                      (-28.5 to -30.5 feet)

0–51 cm

Mudstone; dark gray; massive bedding; no apparent lamination; scattered small fossils.

Condition: Broken into pieces and some lost core. Pieces partly displaced.

51–60 cm

Mudstone, dark gray, fine grained, massive bedding; no apparent lamination; scattered small fossils.

Condition: good.

Part 6-2                      60 cm of core—9.30 to 9.91 m depth                      (-30.5 to -32.5 feet)

0–60 cm

Mudstone; dark gray; fine grained; massive bedding, no apparent lamination, scattered small fossils, small masses of framboidal pyrite present.

Condition good.



LINER SECTION 7                      9.91 to 11.58 m depth                      (-32.5 to -38 feet)

Part 7-1                      60 cm of core—9.91 to 10.52 m depth                      (-32.5 to -34.5 feet)

0–35 cm

Mudstone; dark gray; massive bedding; no apparent lamination; scattered small fossils.

Condition: good

35–60 cm

Mudstone, silty and sandy; dark gray; massive bedding; some fine sand laminae and thin layers; common small fossils; some small diameter burrows.

Condition: good.

Part 7-2                      60 cm of core—10.52 to 11.13 m depth                      (-34.5 to -36.5 feet)

0–44 cm

Mudstone, silty and sandy; dark gray; massive bedding; some fine sand laminae and thin layers; scattered small fossils; some small diameter burrows.

Condition: good.

44–60 cm

Mudstone/sandstone, silty and sandy; dark gray; massive bedding; many fine sand laminae and thin layers; common small fossils; some small diameter burrows; some framboidal pyrite masses.

Condition: good.

Part 7-3                      35 cm of core—11.13 to 11.58 m depth                      (-36.5 to -38 feet)

0–35 cm

Mudstone, silty; dark gray; massive bedding; some fine sand laminae and thin layers; scattered small fossils.

Condition good

End of core section.

LINER SECTION 8                      11.58 to 13.11 m depth                      (-38 to -43 feet)

Part 8-1                                      59 cm of core—11.58 to 12.19 m depth                      (-38 to -40 feet)

0–59 cm

Mudstone, silty; dark gray; fine grained; thick bedded; a few sandy zones; scattered small fossils; some framboidal pyrite in sandy laminae.

Condition: Good, with core separating into thin blocks along bedding planes.

Part 8-2                                      60 cm of core—12.19 to 12.80 m depth                      (-40 to -42 feet)

0–60 cm

Sandstone/mudstone, argillaceous; dark gray; very fine grained; moderately sorted; thick bedded; minor lamination; a few zones of well sorted sand; scattered small and large fossils, including oysters.

Condition: Good.

Part 8-3                                      34 cm of core—12.80 to 13.11 m depth                      (-42 to -43 feet)

0–22 cm

Sandstone/mudstone, argillaceous; dark gray; very fine grained; moderately sorted; thick bedded; minor lamination; a few zones of well sorted sand; scattered small fossils.

Condition: Good.

22–34 cm

Mudstone, silty; dark gray; fine grained; thick bedded; a few sandy zones; scattered small fossils.

Condition: Good.

End of core section.

LINER SECTION 9                      13.11 to 14.63 m depth                      (-43 to -48 feet)

Part 9-1                                  60 cm of core—13.11 to 13.72 m depth                      (-43 to -45 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; fine grained; thick bedded; a few sand laminae; scattered small fossils; a few sand-filled burrows.

Condition: Good.

Part 9-2                                  60 cm of core—13.72 to 14.33 m depth                      (-45 to -47 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; fine grained; thick bedded; a few sand laminae; scattered small fossils; a few sand-filled burrows.

Condition: Good, although broken into many small segments, but all in place.

Part 9-3                      35 cm of core—14.33 to 14.63 m depth    (-47 to -48 feet)

0–35 cm

Mudstone, silty and sandy; dark gray; fine grained; thick bedded; many sand laminae and sandy zones; scattered small fossils; some sand-filled burrows.

Condition: Good.

LINER SECTION 10            14.63 to 16.15 m depth                      (-48 to -53 feet)

Part 10-1                      60 cm of core—14.63 to 15.24 m depth    (-48 to -50 feet)

0–60 cm

Mudstone, silty; dark gray; thick bedded; a few sand laminae; rare small fossils.

Condition: Reasonably good, broken into many small segments, but all in place.

Part 10-2                      60 cm of core—15.24 to 15.85 m depth    (-50 to -52 feet)

0–60 cm

Mudstone, silty; dark gray; thick bedded; a few sand laminae; some small fossils.

Condition: Reasonably good. Broken into many small segments, but all in place.

Part 10-3                      33 cm of core—15.85 to 16.15 m depth    (-52 to -53 feet)

0–33 cm

Mudstone, silty; dark gray; thick bedded; a few sand laminae; rare small fossils; a few sand-filled burrows.

Condition: Fair. Broken into many small segments, with some zones of great breakage and outer margins much broken.

LINER SECTION 11                      16.15 to 17.68 m depth                      (-53 to -58 feet)

Part 11-1                                  60 cm of core—16.15 to 16.76 m depth                      (-53 to -55 feet)

0–19 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; some thin intervals with sand laminae; rare small fossils.

Condition: Fair. Much breakage due to shattering, but pieces in place.

19–60 cm

Mudstone, silty; dark gray; thick bedded; some thin intervals with sand laminae; rare small fossils.

Condition: Good.

Part 11-2                                  60 cm of core—16.76 to 17.37 m depth                      (-55 to -57 feet)

0–60 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; some thin intervals with sand laminae; rare small fossils and an ammonite.

Condition: Good.

Part 11-3                                  35 cm of core—17.37 to 17.68 m depth                      (-57 to -58 feet)

0–35 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; rare small fossils; a few small diameter sand-filled burrows.

Condition: Good.

LINER SECTION 12            17.68 to 19.20 m depth            (-58 to -63 feet)

No core                        30 cm of core—17.68 to 17.98 m depth    (-58 to -59 feet)

Part 12-1                    61 cm of core—17.98 to 18.59 m depth    (-59 to -61 feet)

0–61 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; some sand laminae; rare small fossils.

Condition: Good.

Part 12-2                    60 cm of core—18.59 to 19.20 m depth    (-61 to -63 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; thick bedded; some sand laminae and a few thin intervals with sand laminae; rare small fossils; some small diameter sand-filled burrows; some framboidal pyrite in sandy layers.

Condition: Good.

LINER SECTION 13            19.20 to 20.73 m depth            (-63 to -68 feet)

Part 13-1                    60 cm of core—19.20 to 19.81 m depth    (-63 to -65 feet)

0–60 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; some sand laminae; rare small fossils; a few small diameter sand-filled burrows.

Condition: Good.

Part 13-2                      60 cm of core—19.81 to 20.42 m depth    (-65 to -67 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; thick bedded; partly laminated; some sand laminae; rare small fossils; a few small diameter sand-filled burrows; some framboidal pyrite masses in sandy intervals.

Condition: Good.

Part 13-3                      33 cm of core—20.42 to 20.73 m depth    (-67 to -68 feet)

0–25 cm

Mudstone, silty and sandy; dark gray; thick bedded; partly laminated; some sand laminae; rare small fossils; a few small diameter sand-filled burrows.

Condition: Good.

25–33 cm

No core

LINER SECTION 14            20.73 to 22.25 m depth                      (-68 to -73 feet)

Part 14-1                      60 cm of core—20.73 to 21.34 m depth    (-68 to -70 feet)

0–53 cm

Mudstone, silty; dark gray; thick bedded; minor lamination; some sand laminae; rare small fossils, including a fragment of solitary coral at 38 cm level; a few small diameter sand-filled burrows; gradational basal contact.

Condition: Good.

53–60 cm

Sandstone/mudstone, silty; dark gray; sand of very fine grain size; sand quartzose; thick bedded; vague lamination; rare small fossils and fossil fragments.

Condition: Good.

Part 14-2                      60 cm of core—21.34 to 21.95 m depth    (-70 to -72 feet)

0–54 cm

Sandstone/mudstone, silty; dark gray; sand of very fine grain size; sand quartzose; thick bedded; much lamination; rare small fossils; some small and medium diameter sand-filled burrows; gradational basal contact.

Condition: Good.

54–60 cm

Sandstone, argillaceous; silty; dark gray, with many light colored clean sand laminae; very fine grain size; poorly sorted, except for well sorted clean sand laminae; quartzose; thick bedded; laminated; some fossil fragments; some small diameter sand-filled burrows.

Condition: Good.

Part 14-3                      36 cm of core—(21.95 to 22.25 m depth    (-72 to -73 feet)

0–8 cm

Sandstone, argillaceous; silty; dark gray, with many light colored clean sand laminae; very fine grain size; poorly sorted, except for well sorted clean sand laminae; quartzose; thick bedded; laminated; some fossil fragments; common horizontal and vertical sand-filled burrows.

Condition: Good.



8–36 cm

Sandstone/mudstone, silty; dark gray; sand of very fine grain size; sand quartzose; thick bedded; much lamination; rare small fossils; some small and medium diameter sand-filled burrows.

Condition: Good.

LINER SECTION 15                      22.25 to 23.77 m depth                      (-73 to -78 feet)

Part 15-1                                  60 cm of core—22.25 to 22.86 m depth                      (-73 to -75 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; sand content high in lowest 20 cm; thick bedded; minor lamination; common sand laminae; rare small fossils, including a fragment of solitary coral at 38 cm level; a few small diameter sand-filled burrows.

Condition: Good.

Part 15-2                                  60 cm of core—22.86 to 23.47 m depth                      (-75 to -77 feet)

0–60 cm

Mudstone, silty and sandy; dark gray; thick bedded; common sand laminae; rare small fossils; a few small diameter sand-filled burrows; some framboidal pyrite masses.

Condition: Good, except for shattering in a few places.

Part 15-3                                  33 cm of core—23.47 to 23.77 m depth                      (-77 to -78 feet)

0–33 cm

Mudstone, silty and sandy; dark gray; thick bedded; some sand laminae and a thin interval with many sand laminae near base; rare small fossils; a few small diameter burrows.

Condition: Fair; much shattering, but full diameter and pieces still in place.