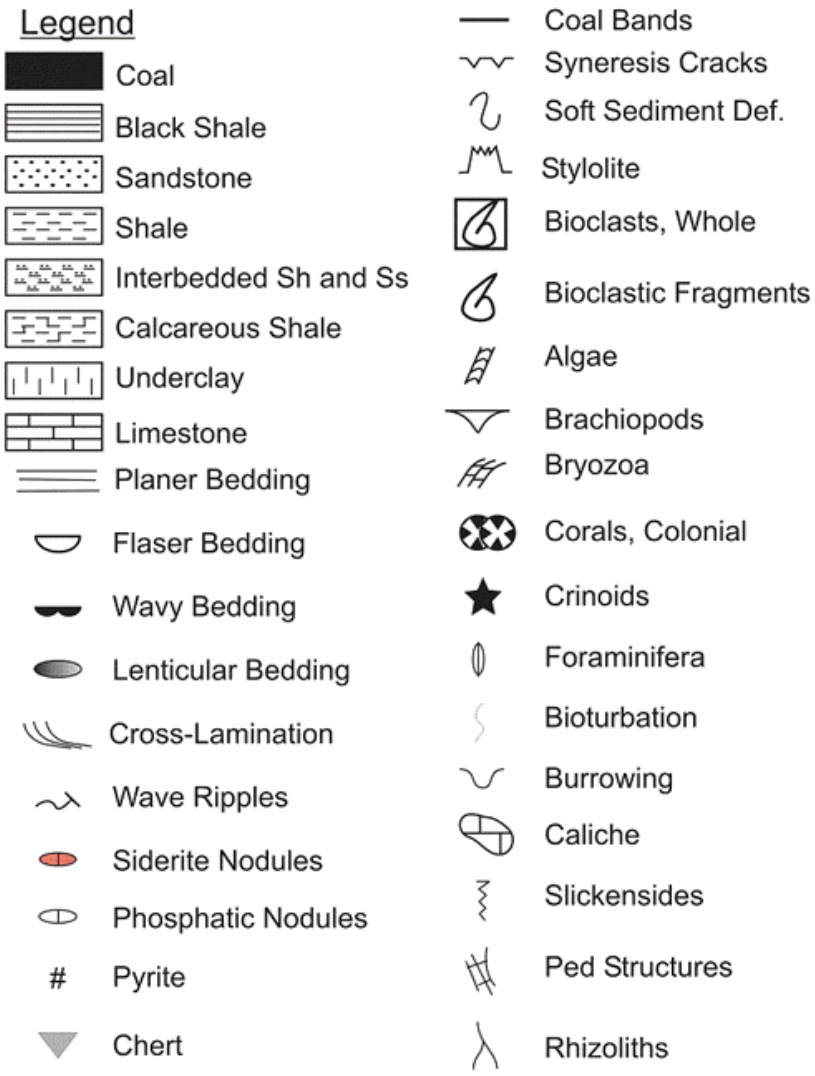
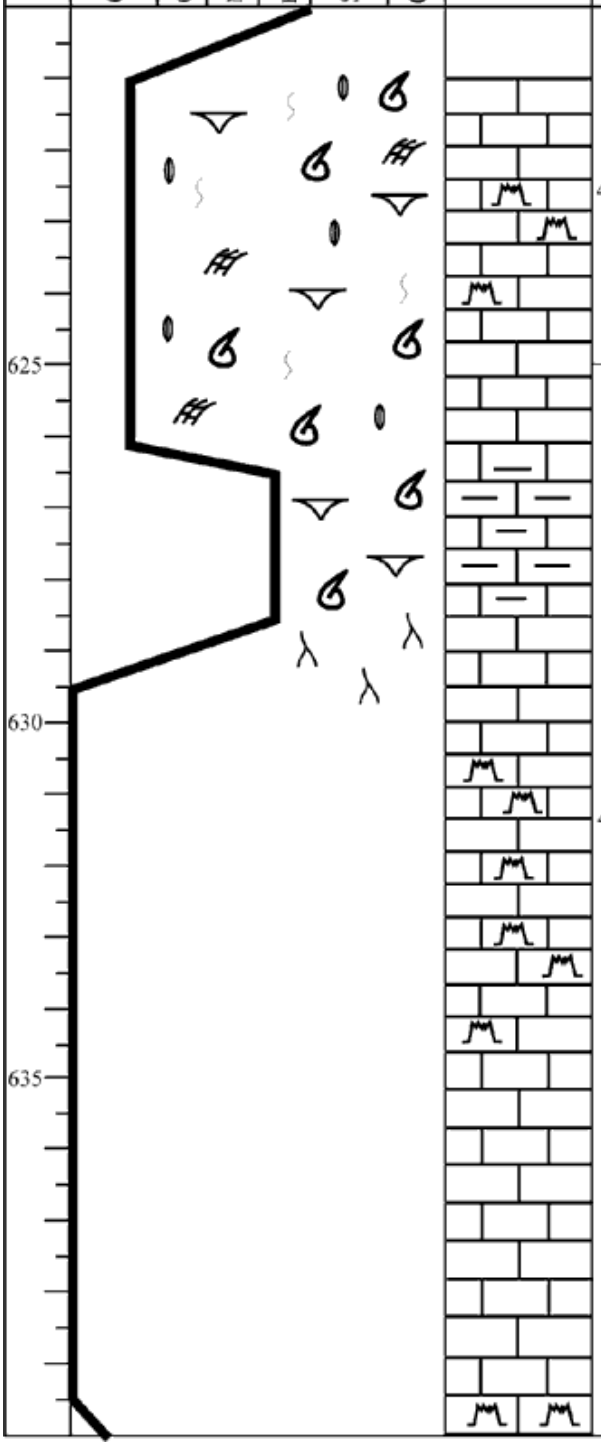
Appendix 1: Descriptions of Core

Hinthorn CW#1
Colt Energy and Kansas Geological Survey
SE SE SE 14-T32S-R16E



NAME HINTHORN CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Fort Scott

PAGE 01 OF 24 PAGES

REMARKS, INTERPRETATION

Limestone
- Light gray to tan
- Calcareous
- Medium Bedded
- Stylolites and horse tail stlyolites
- Rooting and plant fragments
- Calcite veins
- Gradational upper contact
- Bioturbated
- Abundant bioclasts of brachiopods, tabulate corals, fusilinids, and bryozoans
- Slightly oil stained

Top of Fort Scott - Higginsville Limestone

Bioclastic packstone facies
-Shallowing upward, regressive upper limestone

- Above wave base

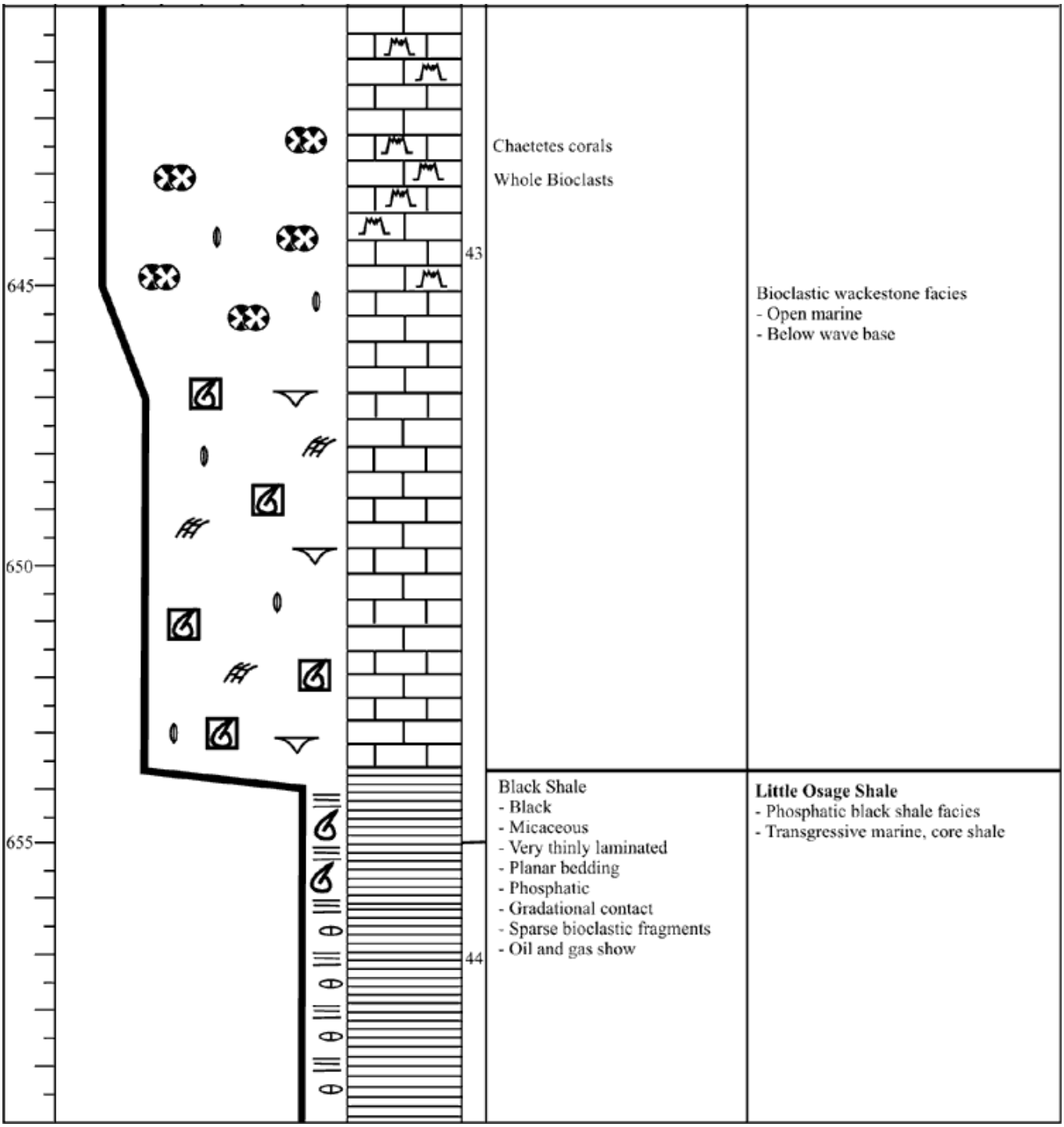
Bioclastic mudstone facies
- Transgressive muddy limestone

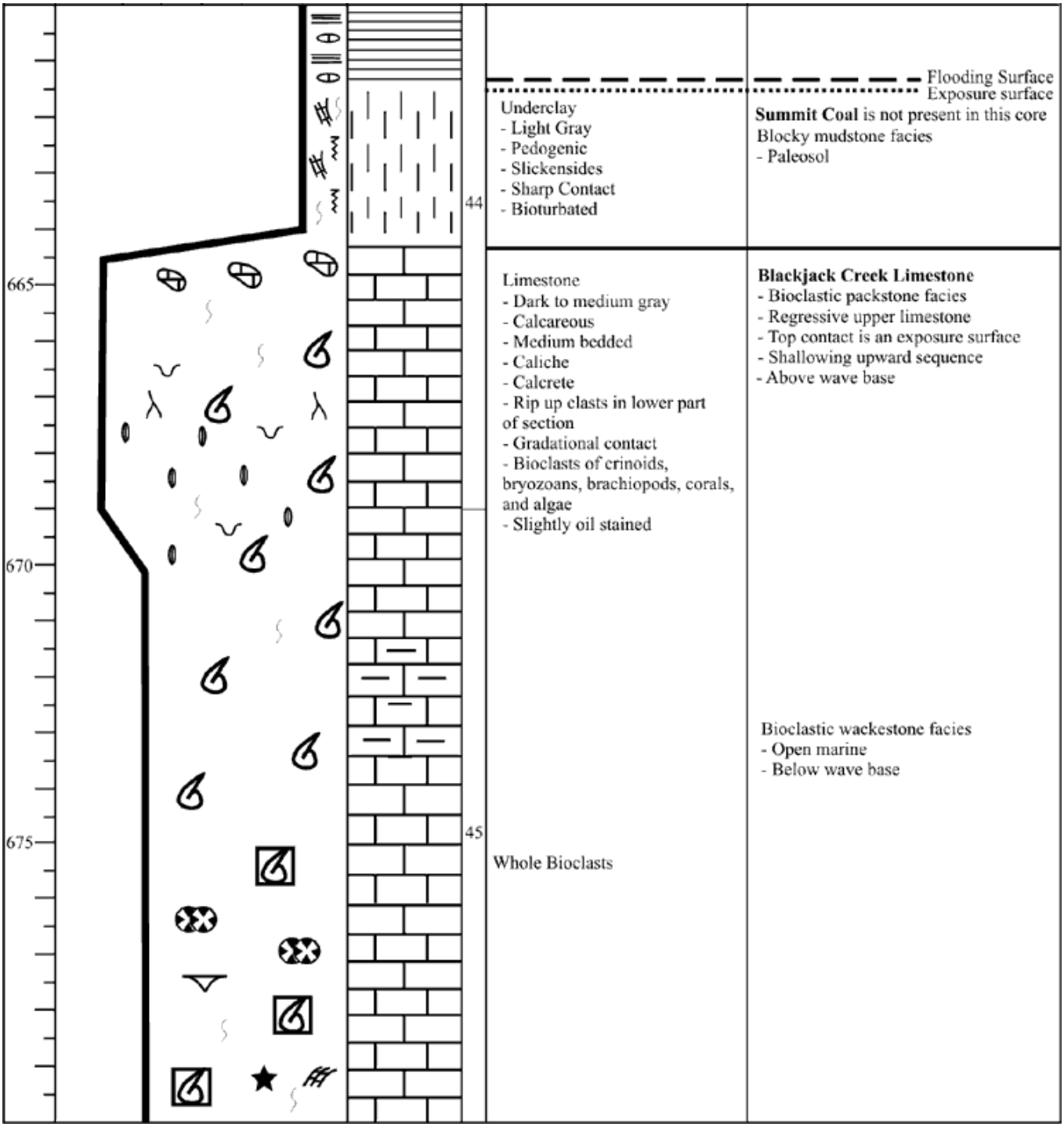
Flooding Surface

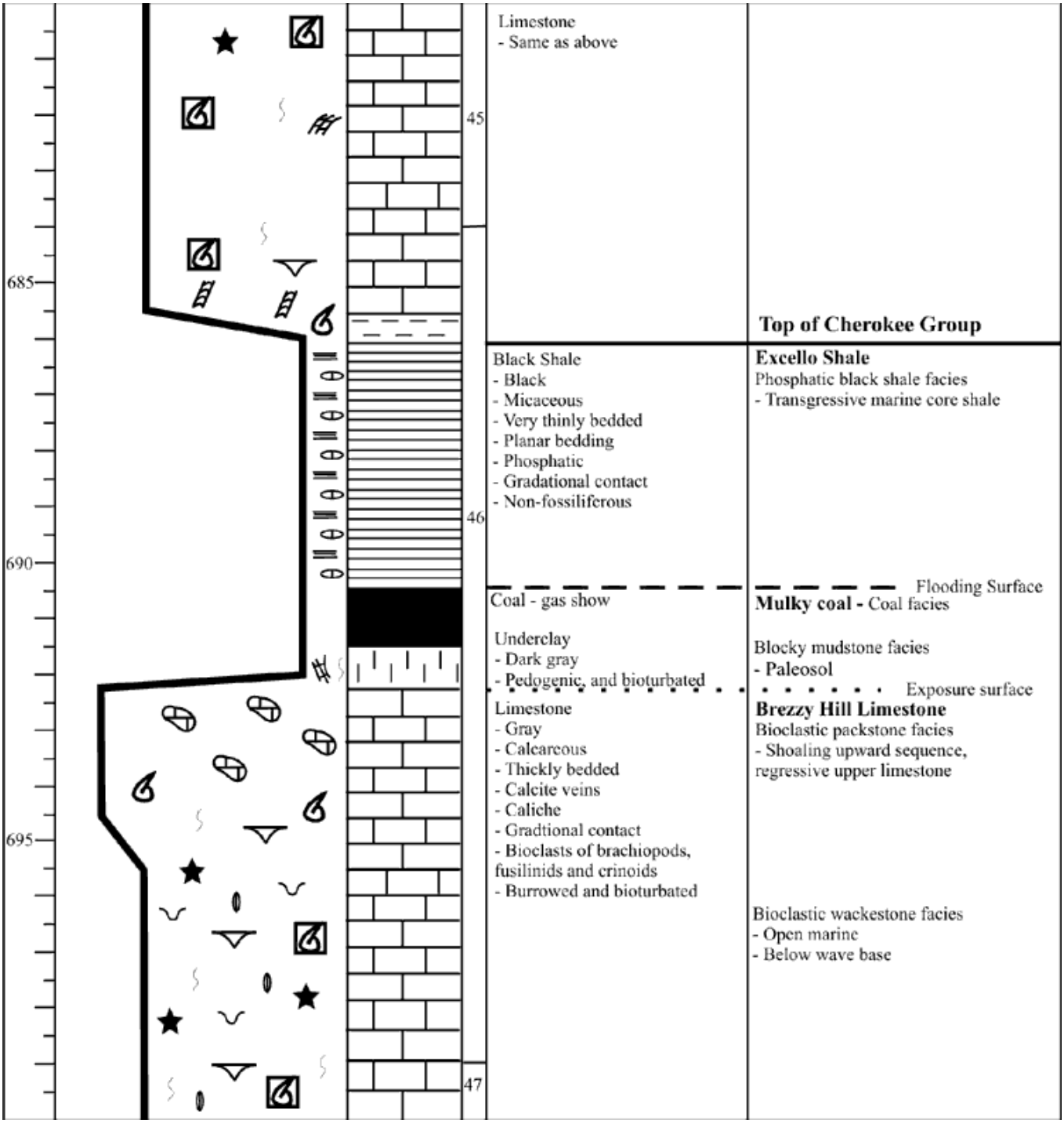
Exposure Surface

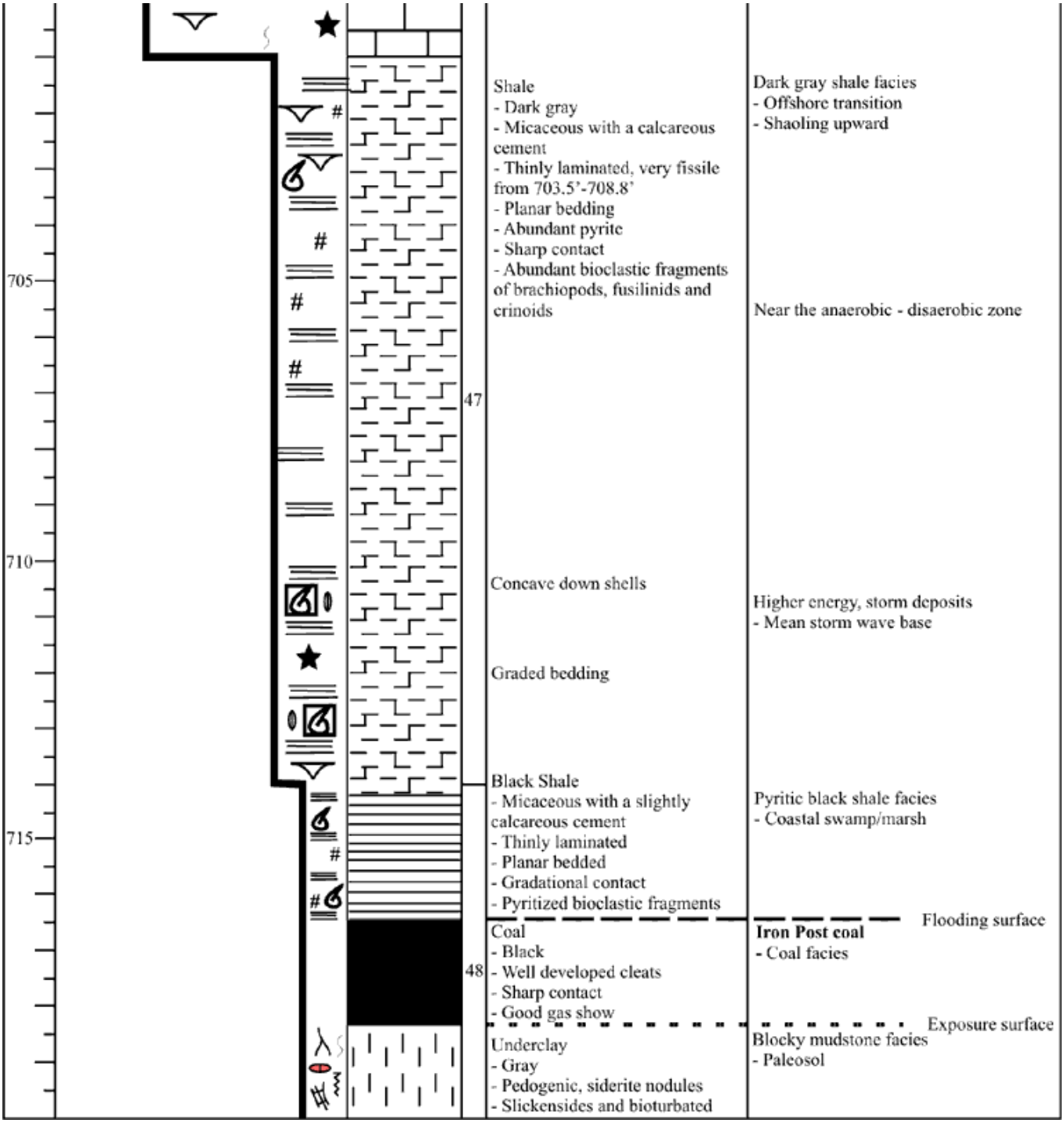
Peloidal grainstone facies
- Open marine
- Above wave base

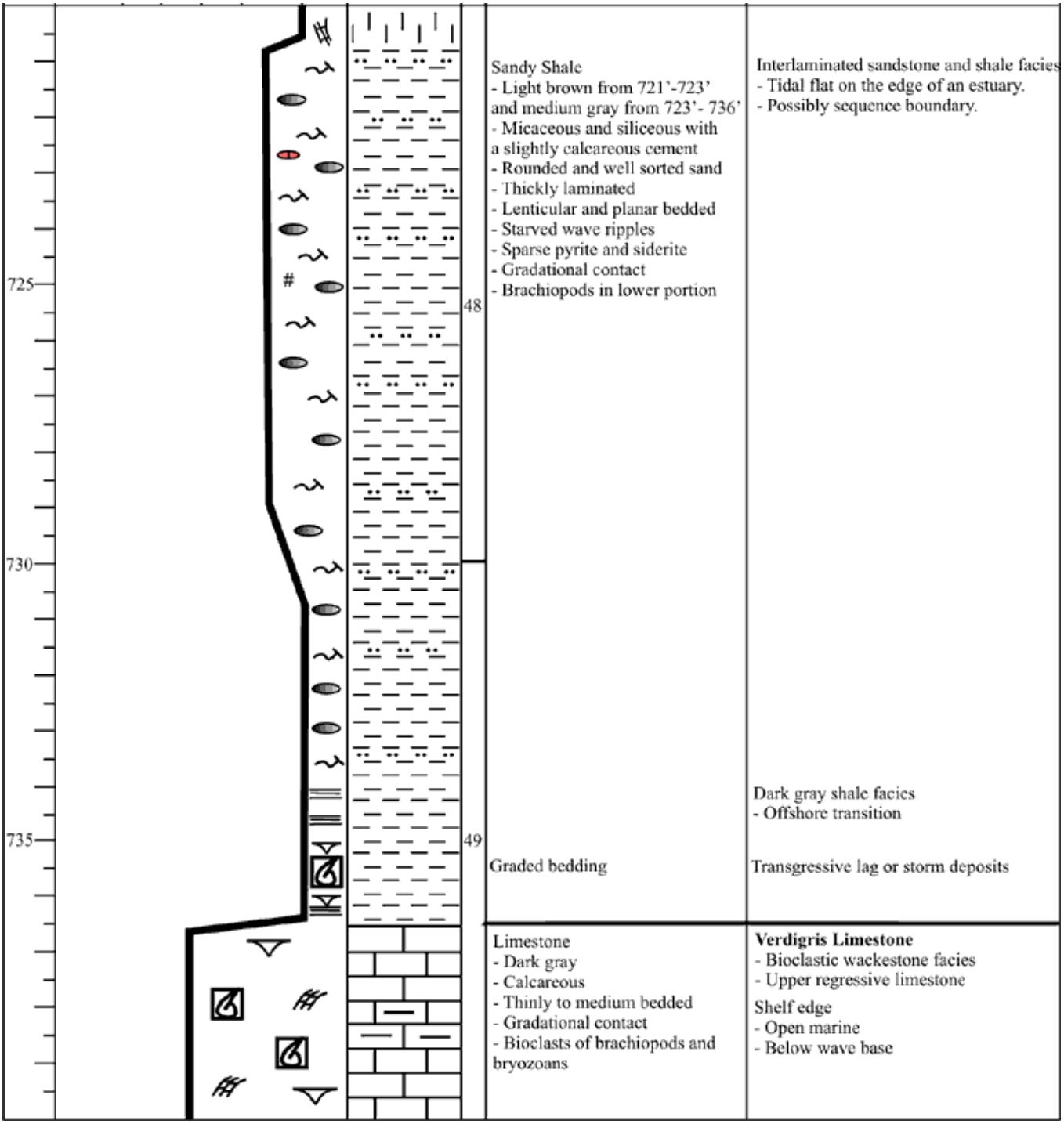
Peloidal and non-fossiliferous from 631' - 640'


645
650
655
43
44
Chaetetes corals
Whole Bioclasts
Bioclastic wackestone facies
- Open marine
- Below wave base
Black Shale
- Black
- Micaceous
- Very thinly laminated
- Planar bedding
- Phosphatic
- Gradational contact
- Sparse bioclastic fragments
- Oil and gas show
Little Osage Shale
- Phosphatic black shale facies
- Transgressive marine, core shale

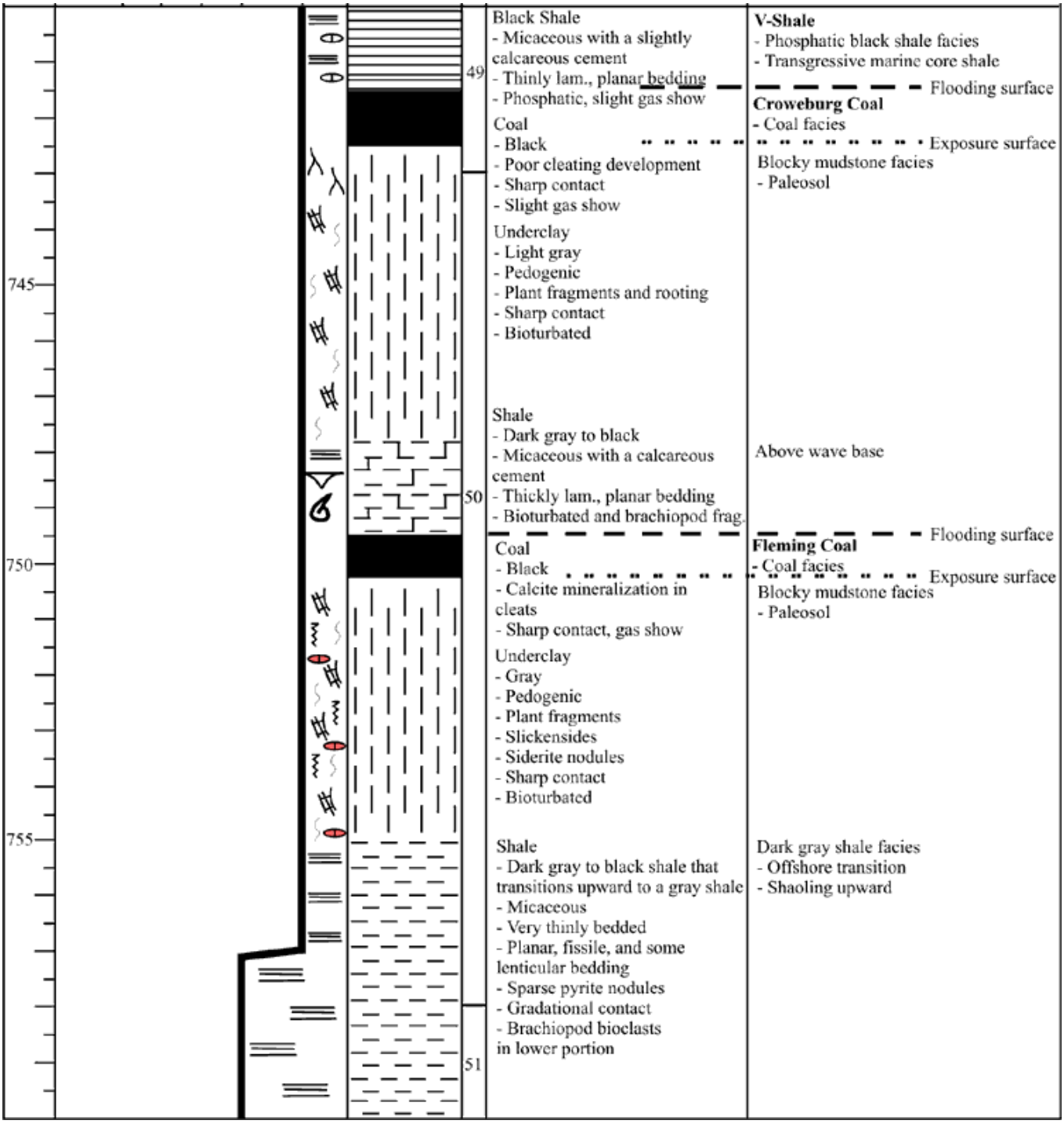

665
670
675
44
45
Flooding Surface
Exposure surface
Underclay
- Light Gray
- Pedogenic
- Slickensides
- Sharp Contact
- Bioturbated
Summit Coal is not present in this core
Blocky mudstone facies
- Paleosol
Limestone
- Dark to medium gray
- Calcareous
- Medium bedded
- Caliche
- Calcrete
- Rip up clasts in lower part of section
- Gradational contact
- Bioclasts of crinoids, bryozoans, brachiopods, corals, and algae
- Slightly oil stained
Blackjack Creek Limestone
- Bioclastic packstone facies
- Regressive upper limestone
- Top contact is an exposure surface
- Shallowing upward sequence
- Above wave base
Bioclastic wackestone facies
- Open marine
- Below wave base
Whole Bioclasts

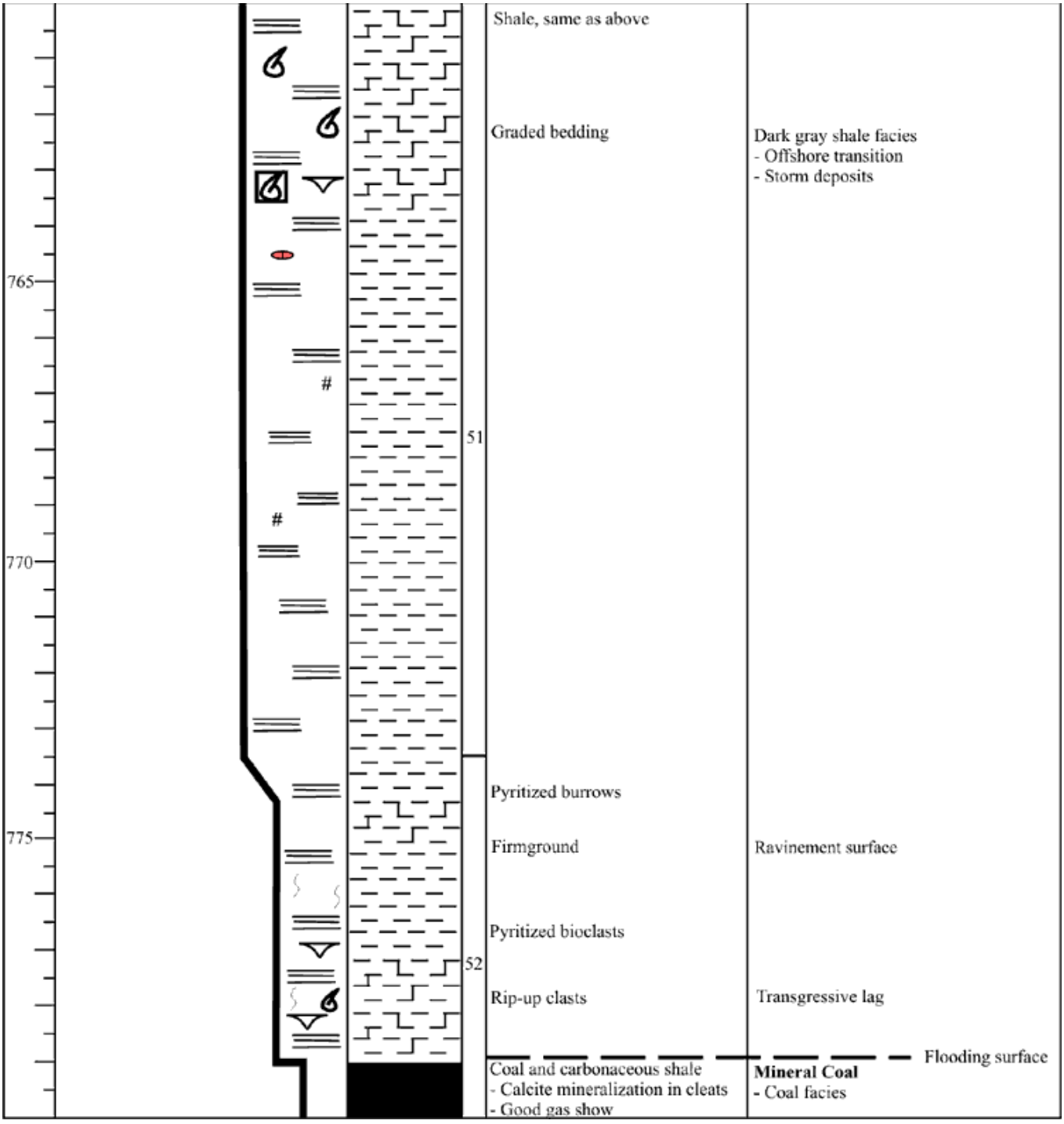

685
690
695
45
46
47
Limestone
- Same as above
Top of Cherokee Group
Black Shale
- Black
- Micaceous
- Very thinly bedded
- Planar bedding
- Phosphatic
- Gradational contact
- Non-fossiliferous
Excello Shale
Phosphatic black shale facies
- Transgressive marine core shale
Flooding Surface
Coal - gas show
Mulky coal - Coal facies
Underclay
- Dark gray
- Pedogenic, and bioturbated
Blocky mudstone facies
- Paleosol
Exposure surface
Limestone
- Gray
- Calcareous
- Thickly bedded
- Calcite veins
- Caliche
- Gradtional contact
- Bioclasts of brachiopods, fusilinids and crinoids
- Burrowed and bioturbated
Brezzy Hill Limestone
Bioclastic packstone facies
- Shoaling upward sequence, regressive upper limestone
Bioclastic wackestone facies
- Open marine
- Below wave base

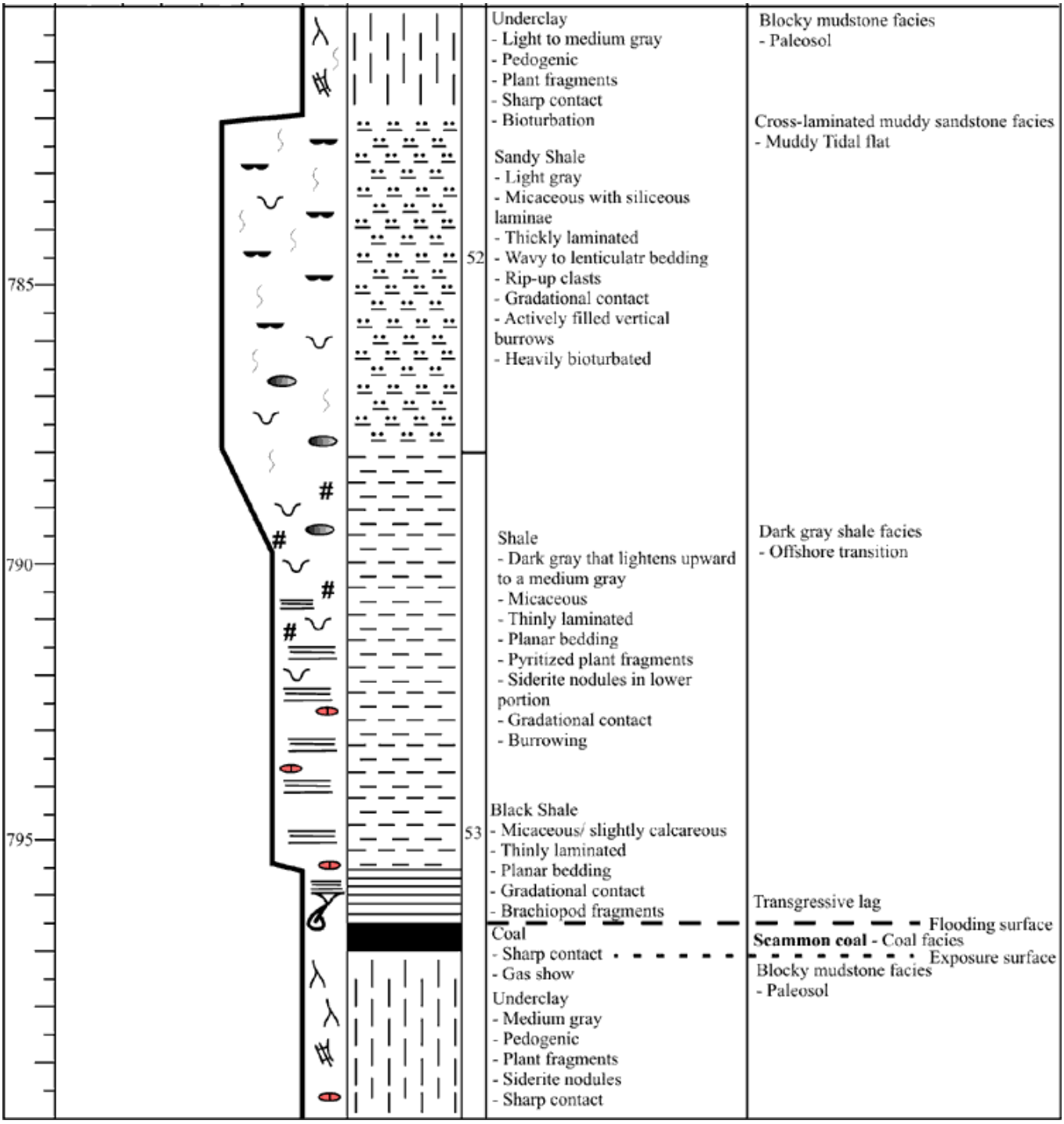

705
710
715
47
48
Shale
- Dark gray
- Micaceous with a calcareous cement
- Thinly laminated, very fissile from 703.5'-708.8'
- Planar bedding
- Abundant pyrite
- Sharp contact
- Abundant bioclastic fragments of brachiopods, fusilinids and crinoids
Dark gray shale facies
- Offshore transition
- Shaoling upward
Near the anaerobic - disaerobic zone
Concave down shells
Higher energy, storm deposits
- Mean storm wave base
Graded bedding
Black Shale
- Micaceous with a slightly calcareous cement
- Thinly laminated
- Planar bedded
- Gradational contact
- Pyritized bioclastic fragments
Pyritic black shale facies
- Coastal swamp/marsh
Flooding surface
Coal
- Black
- Well developed cleats
- Sharp contact
- Good gas show
Iron Post coal
- Coal facies
Exposure surface
Underclay
- Gray
- Pedogenic, siderite nodules
- Slickensides and bioturbated
Blocky mudstone facies
- Paleosol

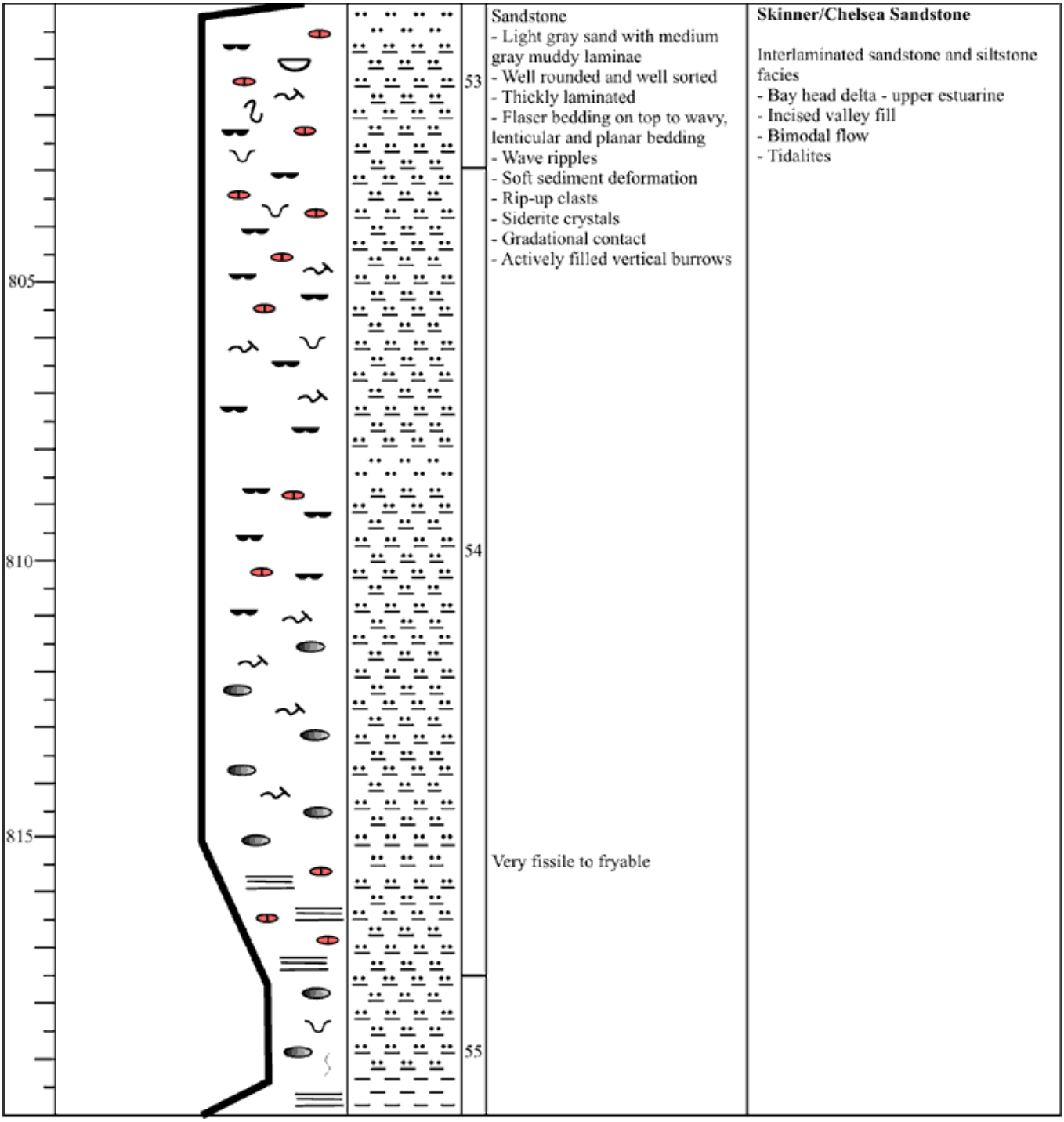


Sandy Shale - Light brown from 721'-723' and medium gray from 723'- 736' - Micaceous and siliceous with a slightly calcareous cement - Rounded and well sorted sand - Thickly laminated - Lenticular and planar bedded - Starved wave ripples - Sparse pyrite and siderite - Gradational contact - Brachiopods in lower portion	Interlaminated sandstone and shale facies - Tidal flat on the edge of an estuary. - Possibly sequence boundary.
	Dark gray shale facies - Offshore transition
Graded bedding	Transgressive lag or storm deposits
Limestone - Dark gray - Calcareous - Thinly to medium bedded - Gradational contact - Bioclasts of brachiopods and bryozoans	**Verdigris Limestone** - Bioclastic wackestone facies - Upper regressive limestone Shelf edge - Open marine - Below wave base


745
750
755
49
50
51
Black Shale
- Micaceous with a slightly calcareous cement
- Thinly lam., planar bedding
- Phosphatic, slight gas show
Coal
- Black
- Poor cleating development
- Sharp contact
- Slight gas show
Underclay
- Light gray
- Pedogenic
- Plant fragments and rooting
- Sharp contact
- Bioturbated
Shale
- Dark gray to black
- Micaceous with a calcareous cement
- Thickly lam., planar bedding
- Bioturbated and brachiopod frag.
Coal
- Black
- Calcite mineralization in cleats
- Sharp contact, gas show
Underclay
- Gray
- Pedogenic
- Plant fragments
- Slickensides
- Siderite nodules
- Sharp contact
- Bioturbated
Shale
- Dark gray to black shale that transitions upward to a gray shale
- Micaceous
- Very thinly bedded
- Planar, fissile, and some lenticular bedding
- Sparse pyrite nodules
- Gradational contact
- Brachiopod bioclasts in lower portion
V-Shale
- Phosphatic black shale facies
- Transgressive marine core shale
Flooding surface
Croweburg Coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Above wave base
Flooding surface
Fleming Coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Dark gray shale facies
- Offshore transition
- Shaoling upward


765
770
775
#
#
51
52
Shale, same as above
Graded bedding
Dark gray shale facies
- Offshore transition
- Storm deposits
Pyritized burrows
Firmground
Ravinement surface
Pyritized bioclasts
Rip-up clasts
Transgressive lag
Flooding surface
Coal and carbonaceous shale
- Calcite mineralization in cleats
- Good gas show
Mineral Coal
- Coal facies


785
790
795
52
53
Underclay
- Light to medium gray
- Pedogenic
- Plant fragments
- Sharp contact
- Bioturbation
Sandy Shale
- Light gray
- Micaceous with siliceous laminae
- Thickly laminated
- Wavy to lenticulatr bedding
- Rip-up clasts
- Gradational contact
- Actively filled vertical burrows
- Heavily bioturbated
Shale
- Dark gray that lightens upward to a medium gray
- Micaceous
- Thinly laminated
- Planar bedding
- Pyritized plant fragments
- Siderite nodules in lower portion
- Gradational contact
- Burrowing
Black Shale
- Micaceous/ slightly calcareous
- Thinly laminated
- Planar bedding
- Gradational contact
- Brachiopod fragments
Coal
- Sharp contact
- Gas show
Underclay
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact
Blocky mudstone facies
- Paleosol
Cross-laminated muddy sandstone facies
- Muddy Tidal flat
Dark gray shale facies
- Offshore transition
Transgressive lag
Flooding surface
Scammon coal - Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol

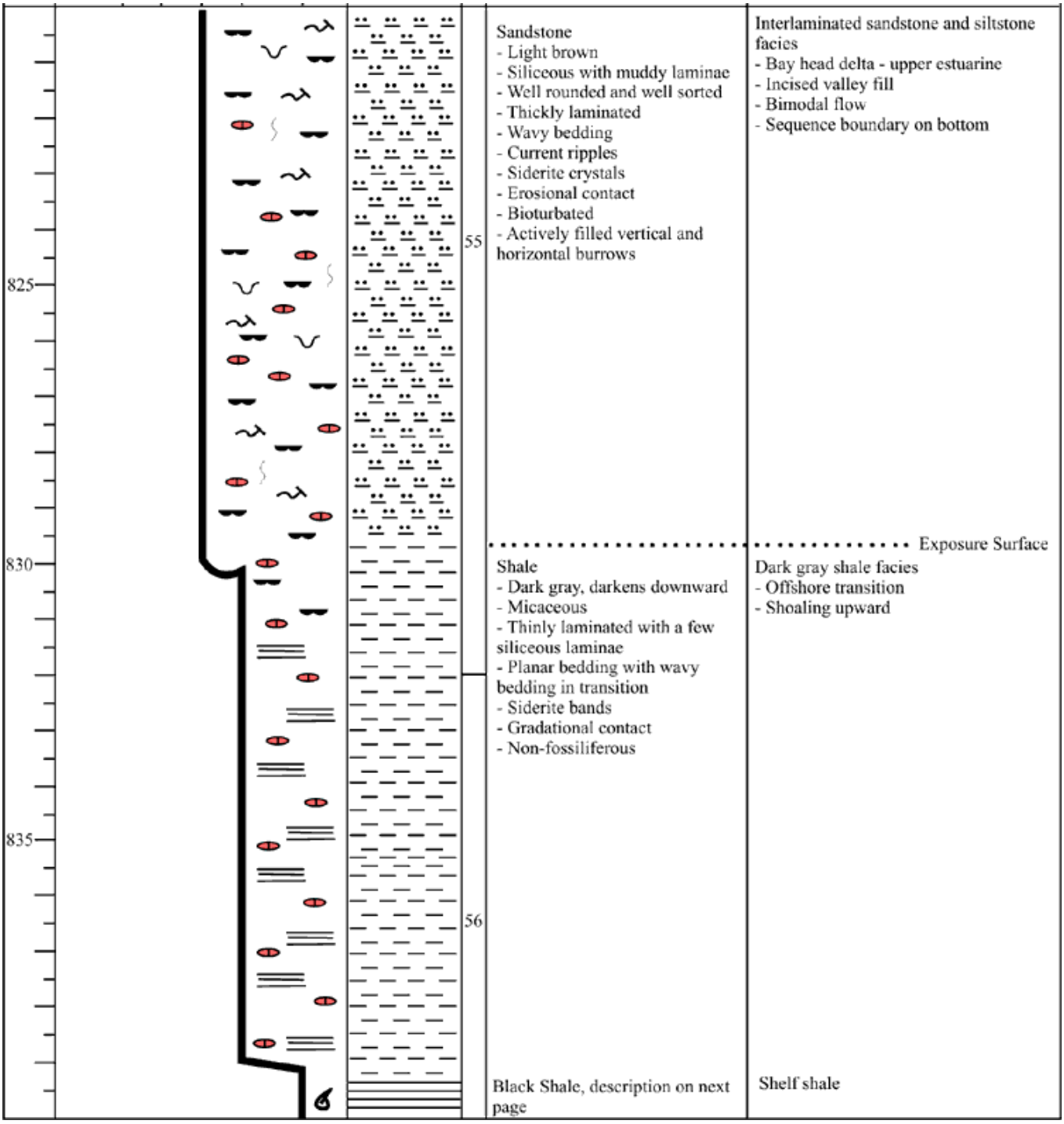


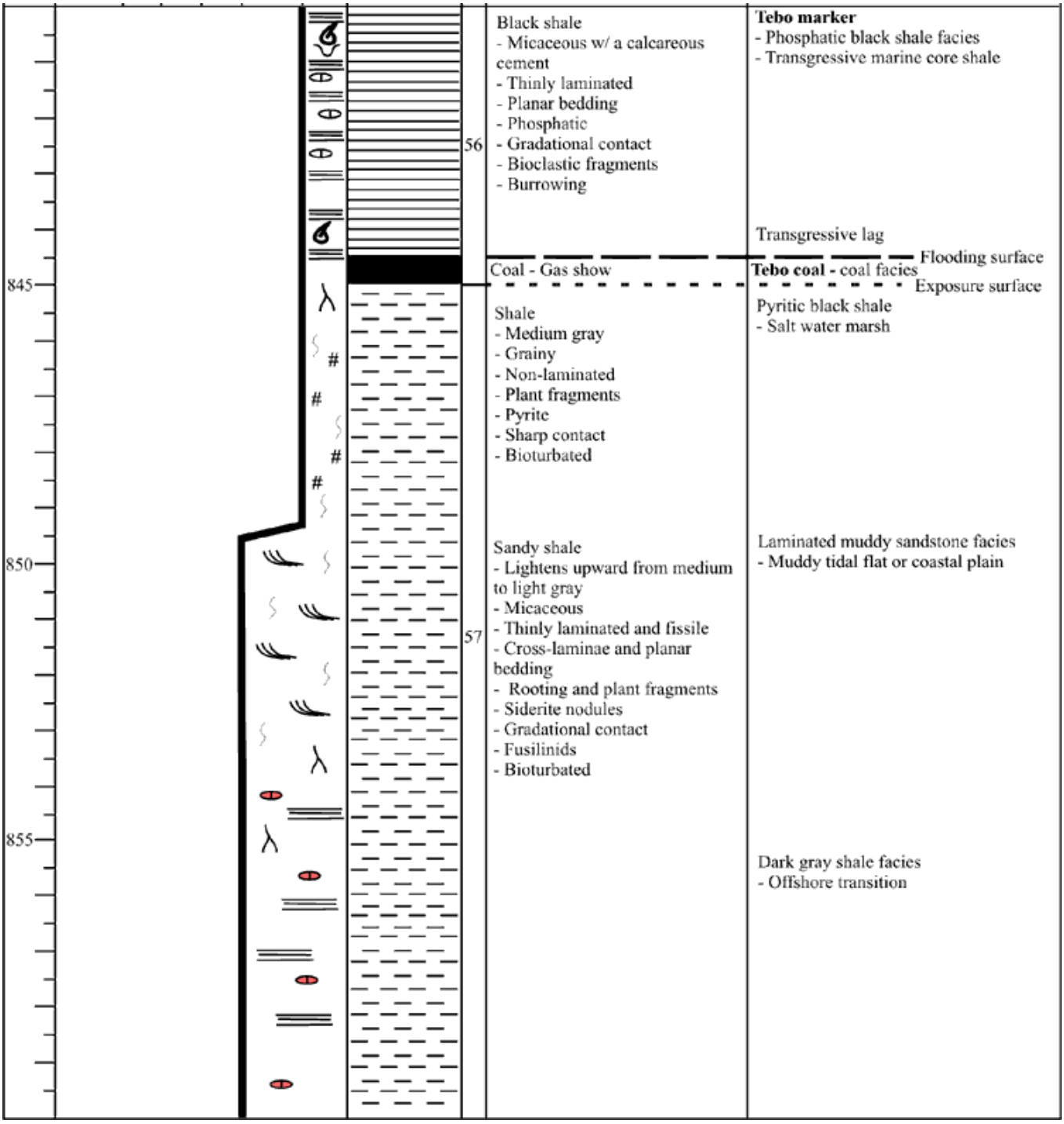
Sandstone
- Light gray sand with medium gray muddy laminae
- Well rounded and well sorted
- Thickly laminated
- Flaser bedding on top to wavy, lenticular and planar bedding
- Wave ripples
- Soft sediment deformation
- Rip-up clasts
- Siderite crystals
- Gradational contact
- Actively filled vertical burrows

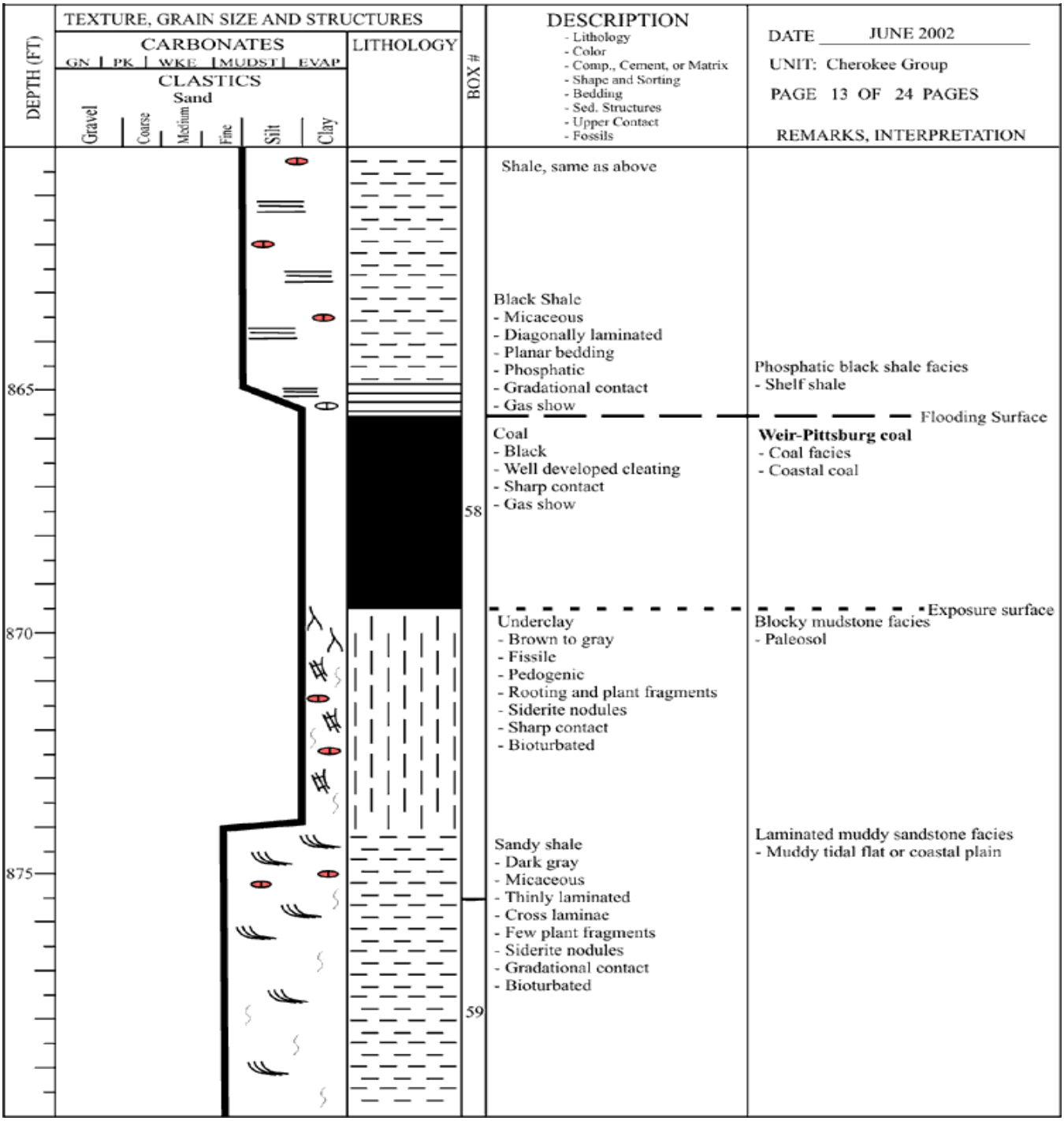
Very fissile to fryable

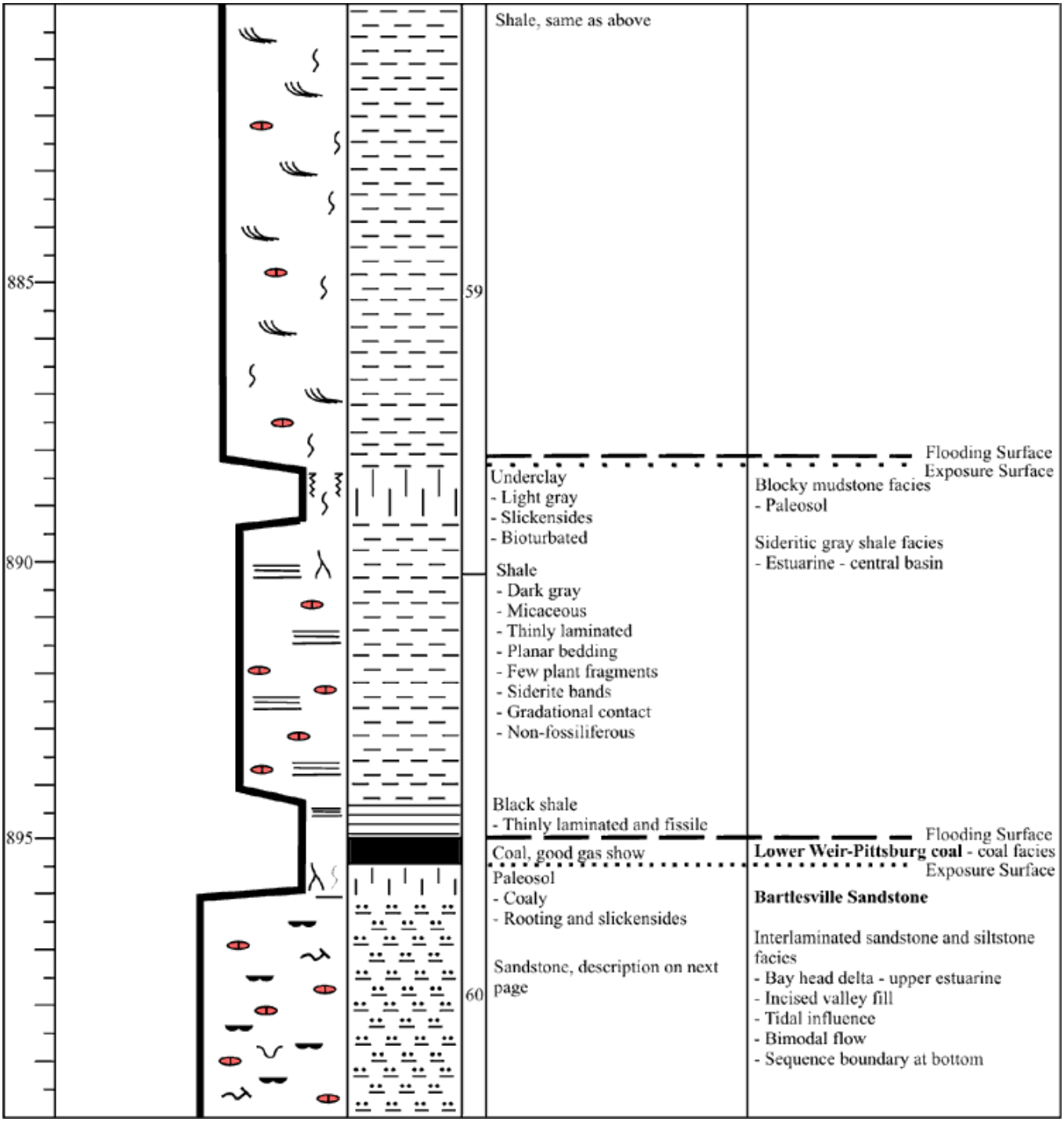
Skinner/Chelsea Sandstone

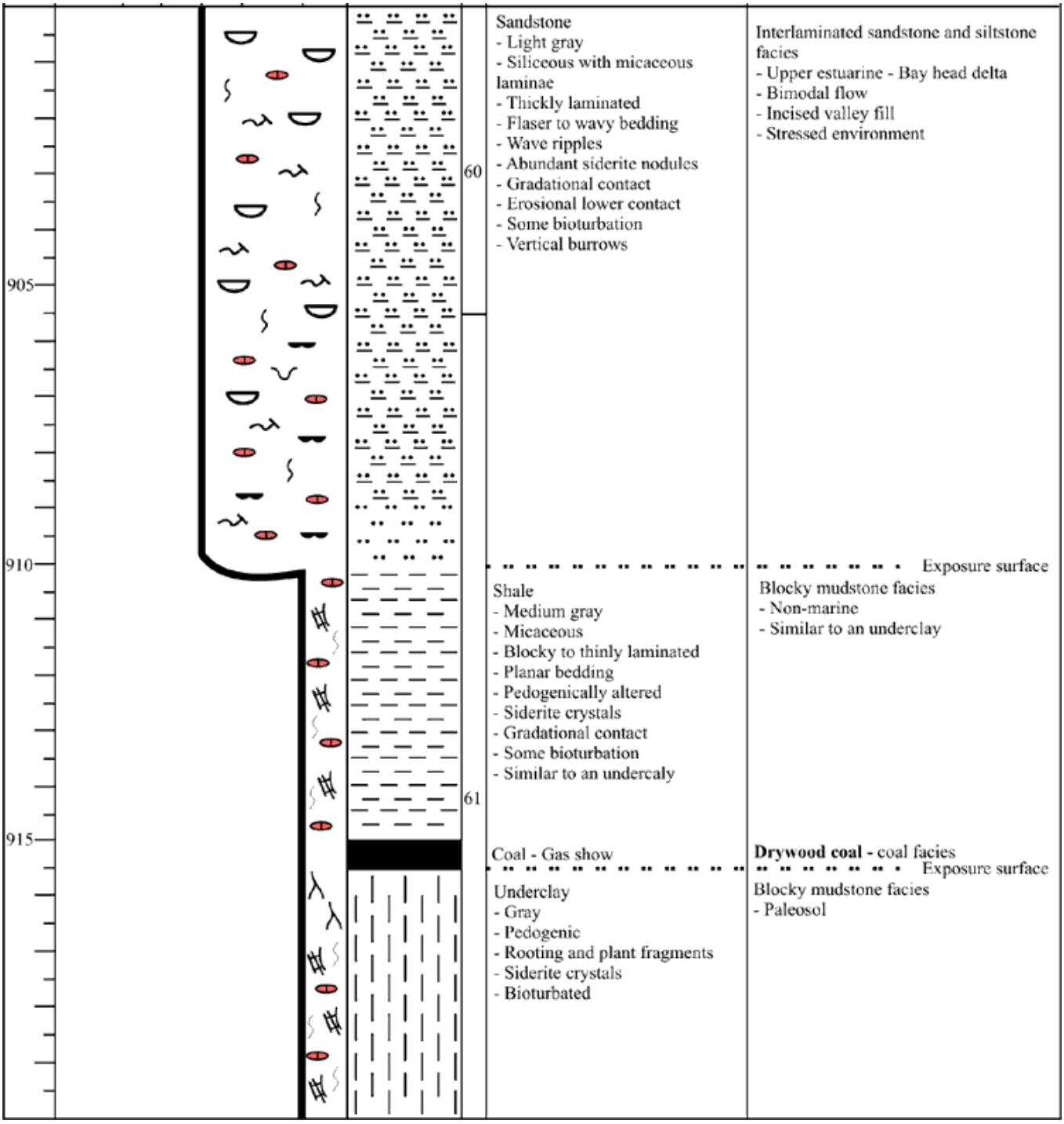
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Incised valley fill
- Bimodal flow
- Tidalites

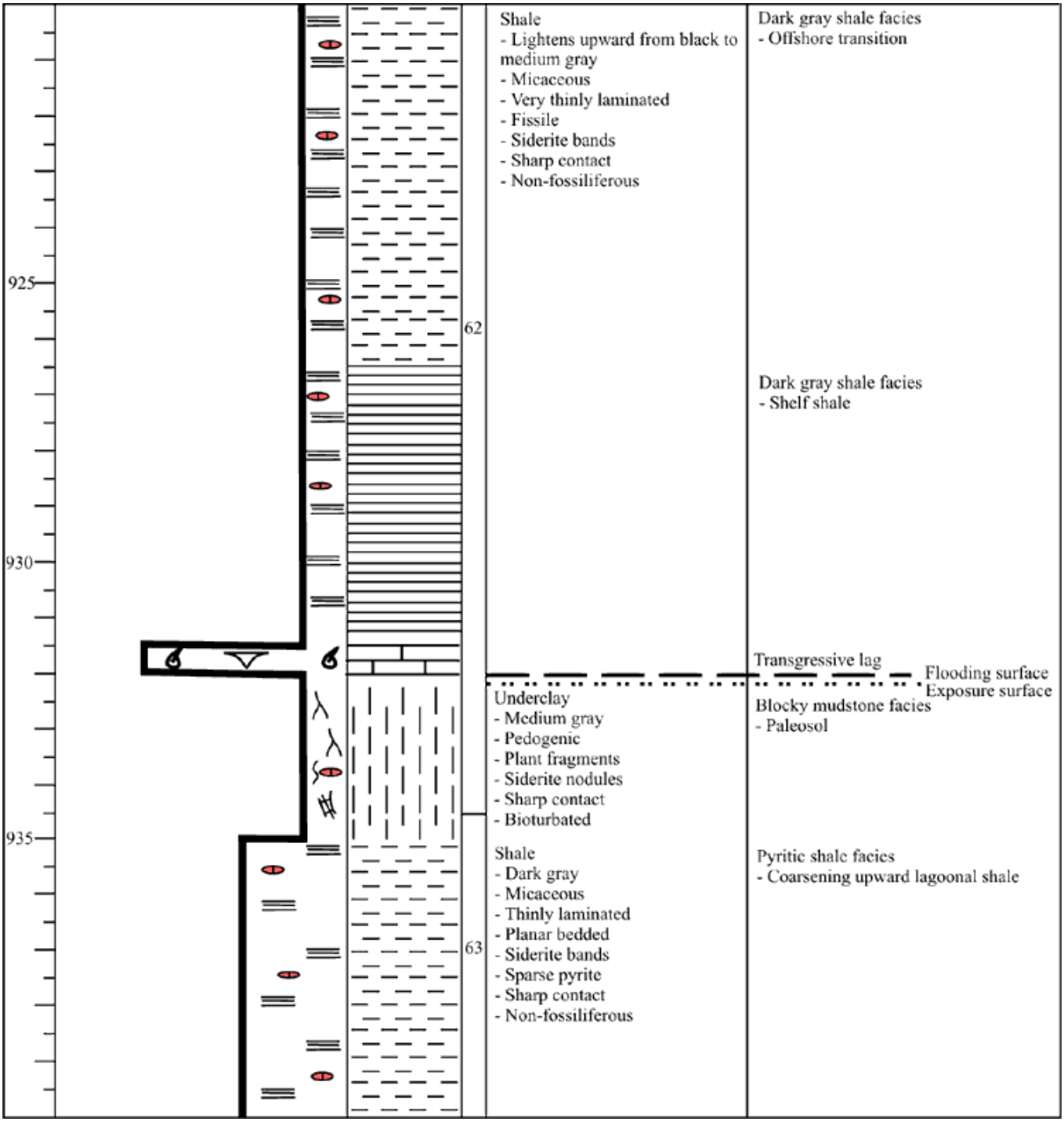

825
830
835
55
56
Sandstone
- Light brown
- Siliceous with muddy laminae
- Well rounded and well sorted
- Thickly laminated
- Wavy bedding
- Current ripples
- Siderite crystals
- Erosional contact
- Bioturbated
- Actively filled vertical and horizontal burrows
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Incised valley fill
- Bimodal flow
- Sequence boundary on bottom
Exposure Surface
Shale
- Dark gray, darkens downward
- Micaceous
- Thinly laminated with a few siliceous laminae
- Planar bedding with wavy bedding in transition
- Siderite bands
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
- Shoaling upward
Black Shale, description on next page
Shelf shale

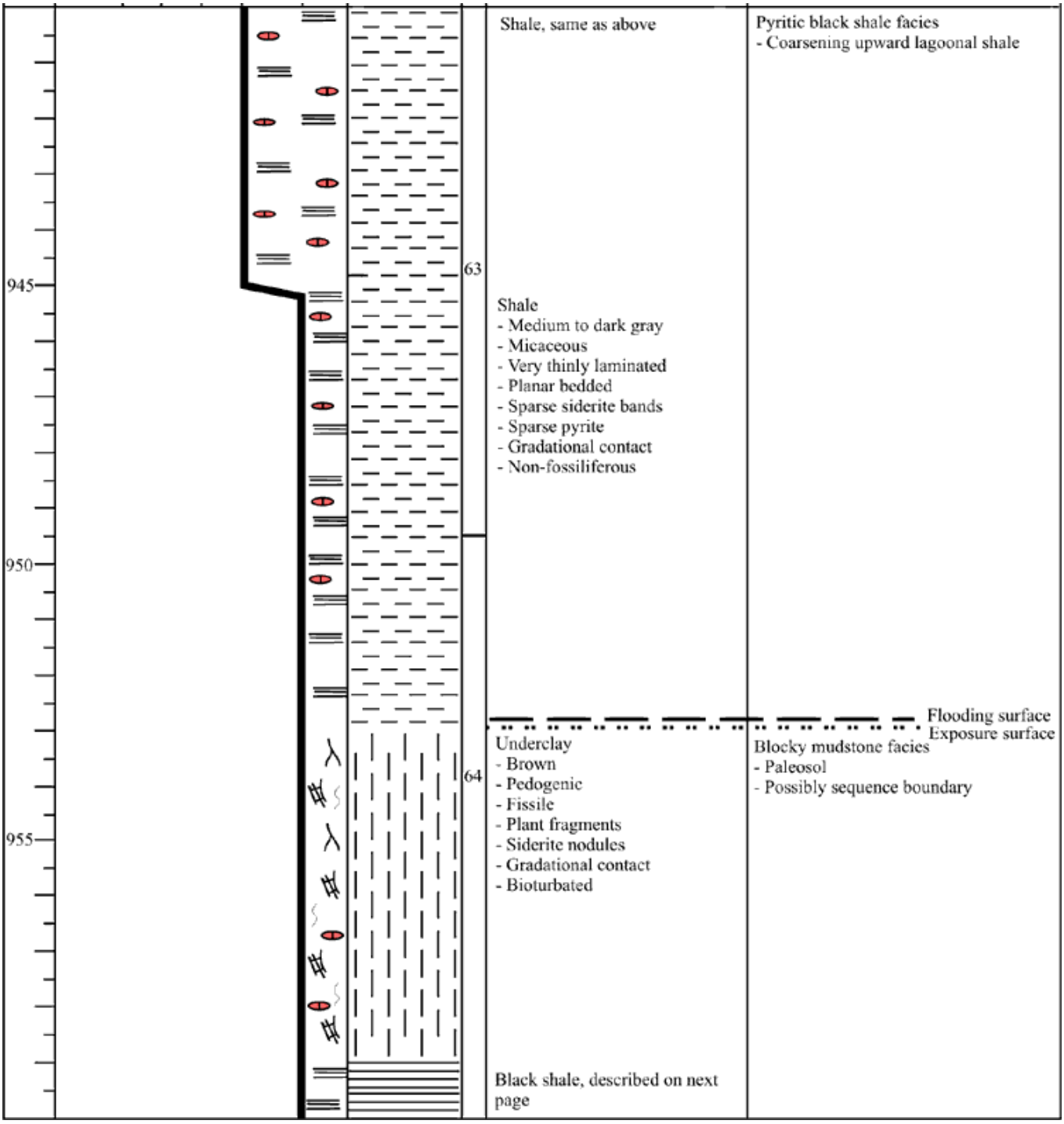

845
850
855
56
57
Black shale
- Micaceous w/ a calcareous cement
- Thinly laminated
- Planar bedding
- Phosphatic
- Gradational contact
- Bioclastic fragments
- Burrowing
Tebo marker
- Phosphatic black shale facies
- Transgressive marine core shale
Transgressive lag
Flooding surface
Coal - Gas show
Tebo coal - coal facies
Exposure surface
Shale
- Medium gray
- Grainy
- Non-laminated
- Plant fragments
- Pyrite
- Sharp contact
- Bioturbated
Pyritic black shale
- Salt water marsh
Sandy shale
- Lightens upward from medium to light gray
- Micaceous
- Thinly laminated and fissile
- Cross-laminae and planar bedding
- Rooting and plant fragments
- Siderite nodules
- Gradational contact
- Fusilinids
- Bioturbated
Laminated muddy sandstone facies
- Muddy tidal flat or coastal plain
Dark gray shale facies
- Offshore transition

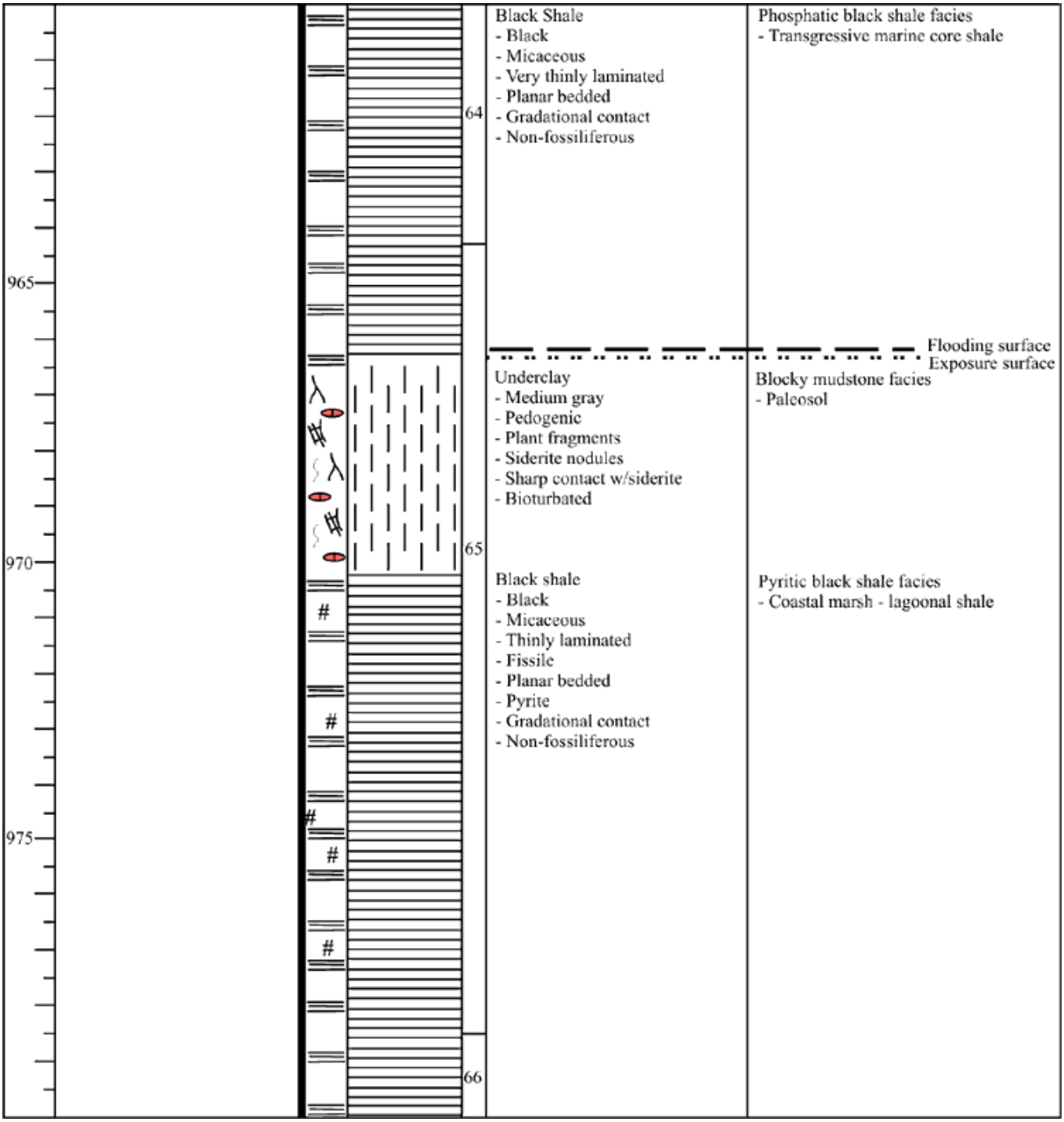

DEPTH (FT)
TEXTURE, GRAIN SIZE AND STRUCTURES
CARBONATES
GN | PK | WKE | MUDST | EVAP
CLASTICS
Sand
Gravel
Coarse
Medium
Fine
Silt
Clay
LITHOLOGY
BOX #
DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils
DATE JUNE 2002
UNIT: Cherokee Group
PAGE 13 OF 24 PAGES
REMARKS, INTERPRETATION
865
870
875
Shale, same as above
Black Shale
- Micaceous
- Diagonally laminated
- Planar bedding
- Phosphatic
- Gradational contact
- Gas show
Phosphatic black shale facies
- Shelf shale
Flooding Surface
Coal
- Black
- Well developed cleating
- Sharp contact
- Gas show
58
Weir-Pittsburg coal
- Coal facies
- Coastal coal
Exposure surface
Underclay
- Brown to gray
- Fissile
- Pedogenic
- Rooting and plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Sandy shale
- Dark gray
- Micaceous
- Thinly laminated
- Cross laminae
- Few plant fragments
- Siderite nodules
- Gradational contact
- Bioturbated
59
Laminated muddy sandstone facies
- Muddy tidal flat or coastal plain

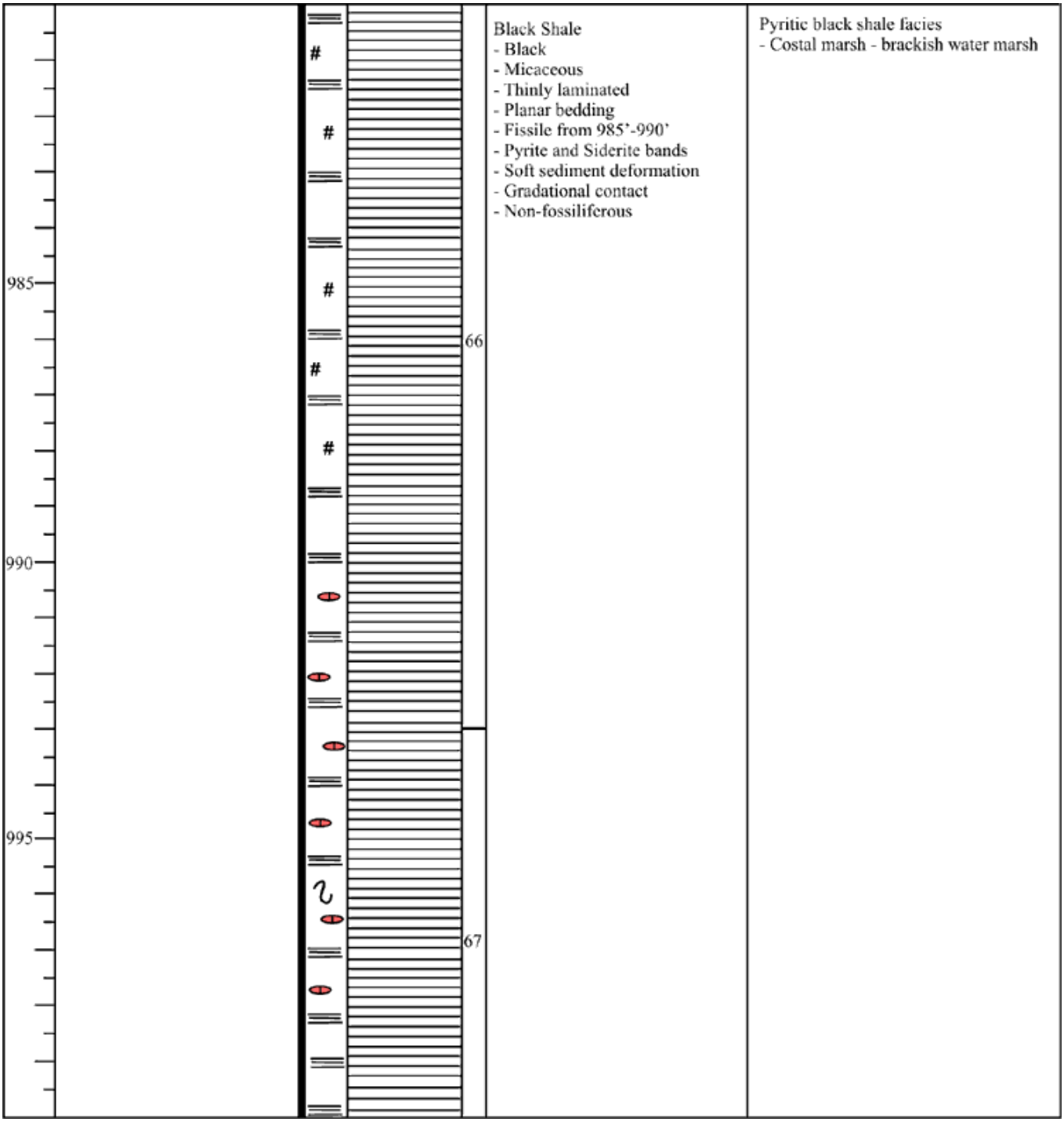

885
890
895
59
60
Shale, same as above
Flooding Surface
Exposure Surface
Underclay
- Light gray
- Slickensides
- Bioturbated
Blocky mudstone facies
- Paleosol
Sideritic gray shale facies
- Estuarine - central basin
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedding
- Few plant fragments
- Siderite bands
- Gradational contact
- Non-fossiliferous
Black shale
- Thinly laminated and fissile
Flooding Surface
Coal, good gas show
Lower Weir-Pittsburg coal - coal facies
Exposure Surface
Paleosol
- Coaly
- Rooting and slickensides
Bartlesville Sandstone
Sandstone, description on next page
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Incised valley fill
- Tidal influence
- Bimodal flow
- Sequence boundary at bottom

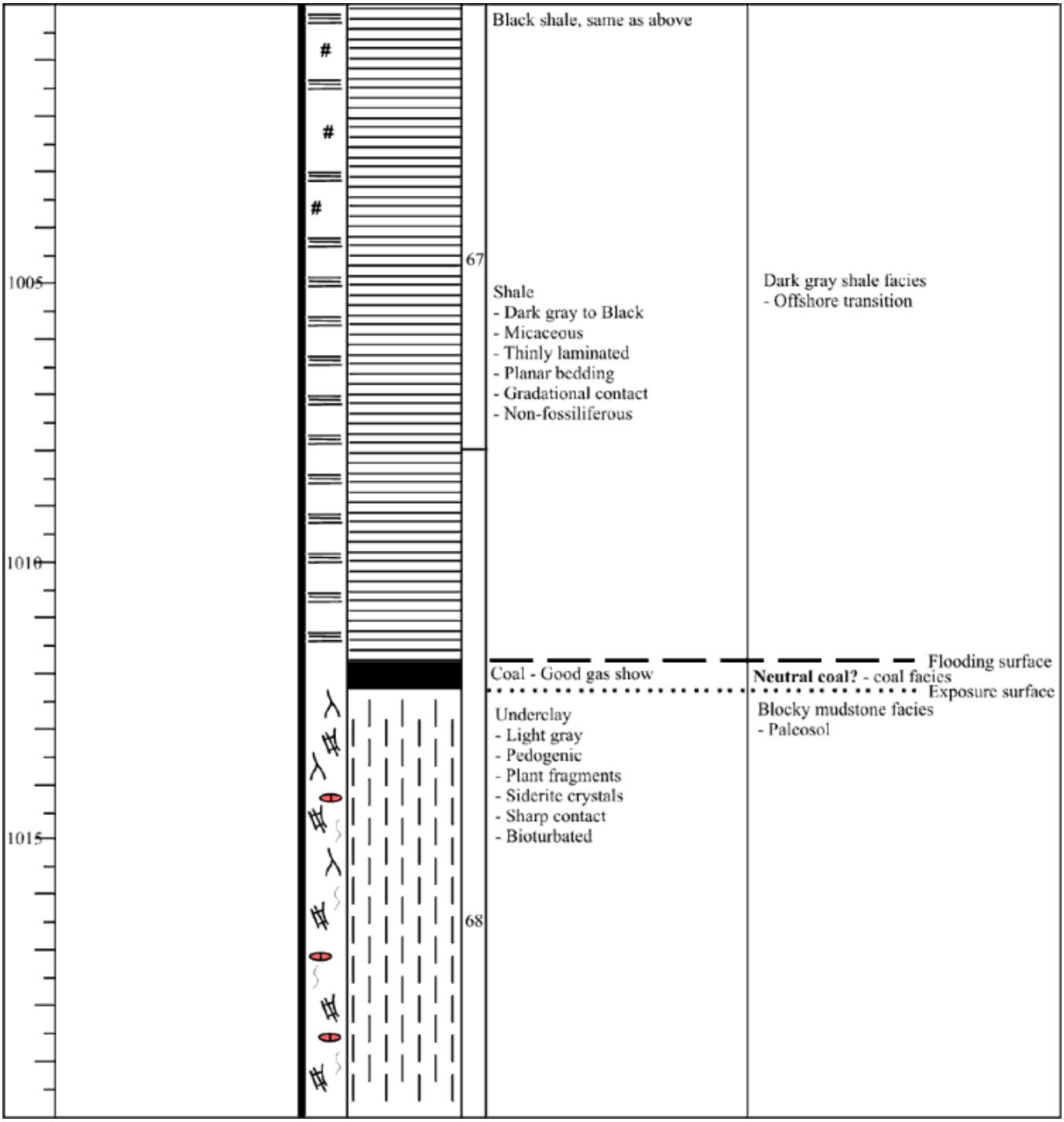

905
910
915
60
61
Sandstone
- Light gray
- Siliceous with micaceous laminae
- Thickly laminated
- Flaser to wavy bedding
- Wave ripples
- Abundant siderite nodules
- Gradational contact
- Erosional lower contact
- Some bioturbation
- Vertical burrows
Interlaminated sandstone and siltstone facies
- Upper estuarine - Bay head delta
- Bimodal flow
- Incised valley fill
- Stressed environment
Exposure surface
Shale
- Medium gray
- Micaceous
- Blocky to thinly laminated
- Planar bedding
- Pedogenically altered
- Siderite crystals
- Gradational contact
- Some bioturbation
- Similar to an undercaly
Blocky mudstone facies
- Non-marine
- Similar to an underclay
Coal - Gas show
Drywood coal - coal facies
Exposure surface
Underclay
- Gray
- Pedogenic
- Rooting and plant fragments
- Siderite crystals
- Bioturbated
Blocky mudstone facies
- Paleosol

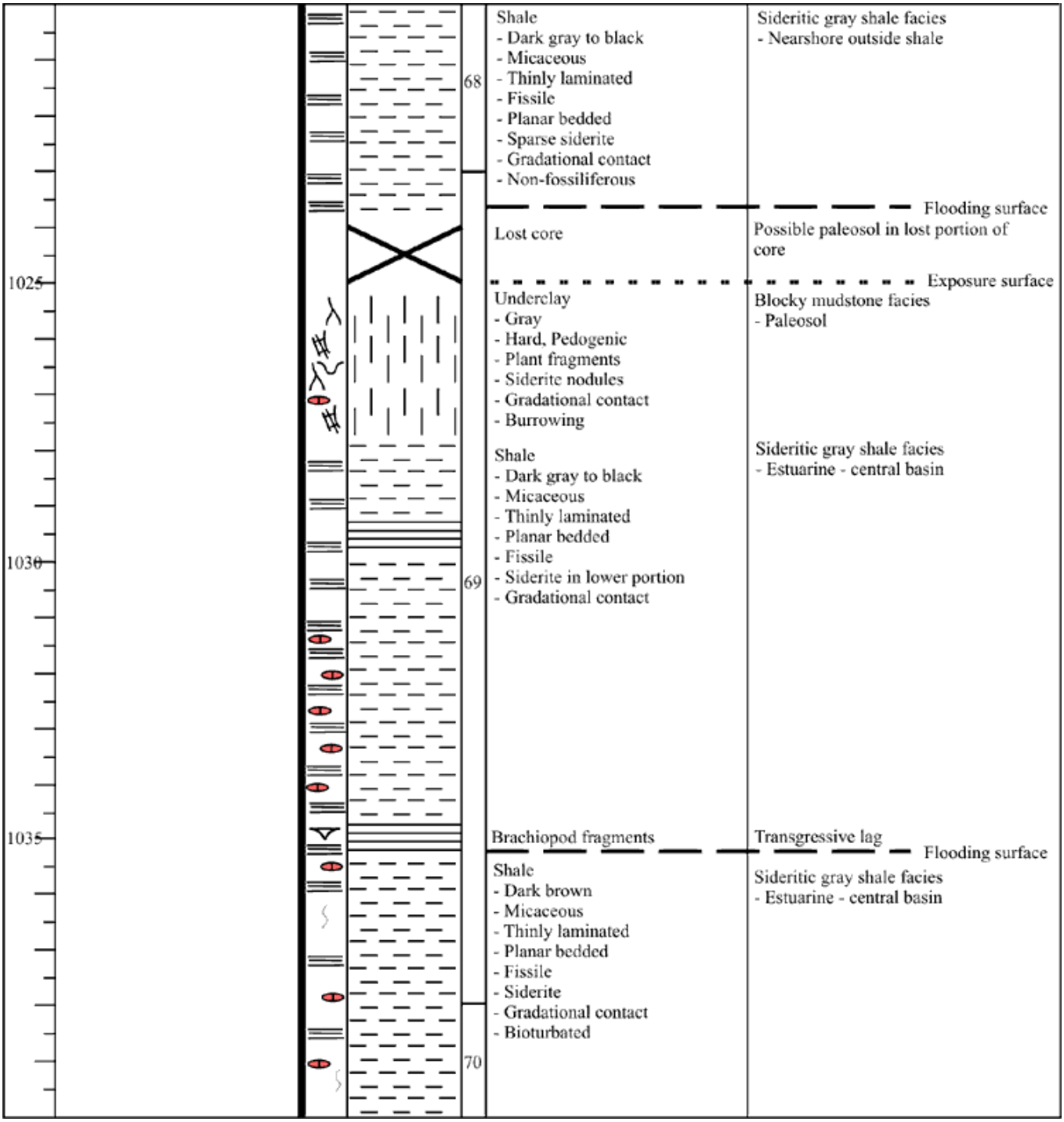

925
930
935
62
63
Shale
- Lightens upward from black to medium gray
- Micaceous
- Very thinly laminated
- Fissile
- Siderite bands
- Sharp contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
Dark gray shale facies
- Shelf shale
Transgressive lag
Flooding surface
Exposure surface
Underclay
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedded
- Siderite bands
- Sparse pyrite
- Sharp contact
- Non-fossiliferous
Pyritic shale facies
- Coarsening upward lagoonal shale

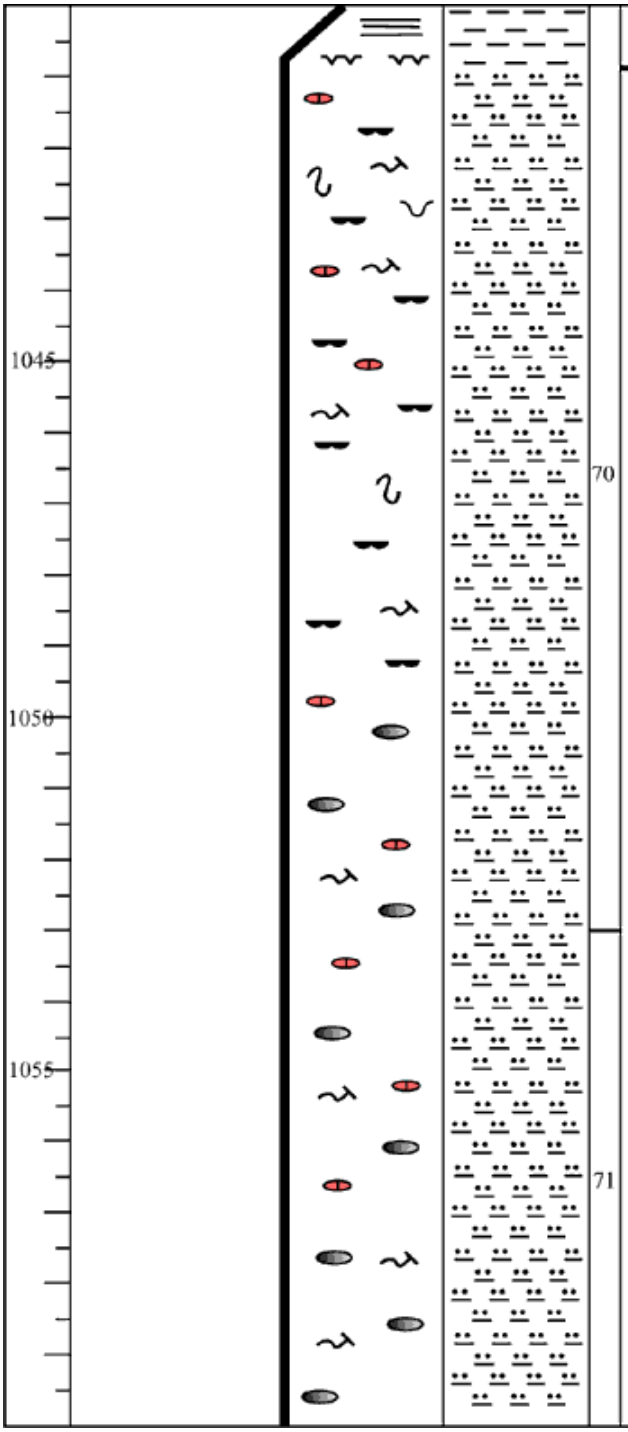

945
950
955
63
64
Shale, same as above
Shale
- Medium to dark gray
- Micaceous
- Very thinly laminated
- Planar bedded
- Sparse siderite bands
- Sparse pyrite
- Gradational contact
- Non-fossiliferous
Underclay
- Brown
- Pedogenic
- Fissile
- Plant fragments
- Siderite nodules
- Gradational contact
- Bioturbated
Black shale, described on next page
Pyritic black shale facies
- Coarsening upward lagoonal shale
Flooding surface
Exposure surface
Blocky mudstone facies
- Paleosol
- Possibly sequence boundary


965
970
975
64
65
66
Black Shale
- Black
- Micaceous
- Very thinly laminated
- Planar bedded
- Gradational contact
- Non-fossiliferous
Phosphatic black shale facies
- Transgressive marine core shale
Flooding surface
Exposure surface
Underclay
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact w/siderite
- Bioturbated
Blocky mudstone facies
- Paleosol
Black shale
- Black
- Micaceous
- Thinly laminated
- Fissile
- Planar bedded
- Pyrite
- Gradational contact
- Non-fossiliferous
Pyritic black shale facies
- Coastal marsh - lagoonal shale


985
990
995
66
67
Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedding
- Fissile from 985'-990'
- Pyrite and Siderite bands
- Soft sediment deformation
- Gradational contact
- Non-fossiliferous
Pyritic black shale facies
- Costal marsh - brackish water marsh


1005
1010
1015
67
68
Black shale, same as above
Shale
- Dark gray to Black
- Micaceous
- Thinly laminated
- Planar bedding
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
Flooding surface
Coal - Good gas show
Neutral coal? - coal facies
Exposure surface
Underclay
- Light gray
- Pedogenic
- Plant fragments
- Siderite crystals
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol

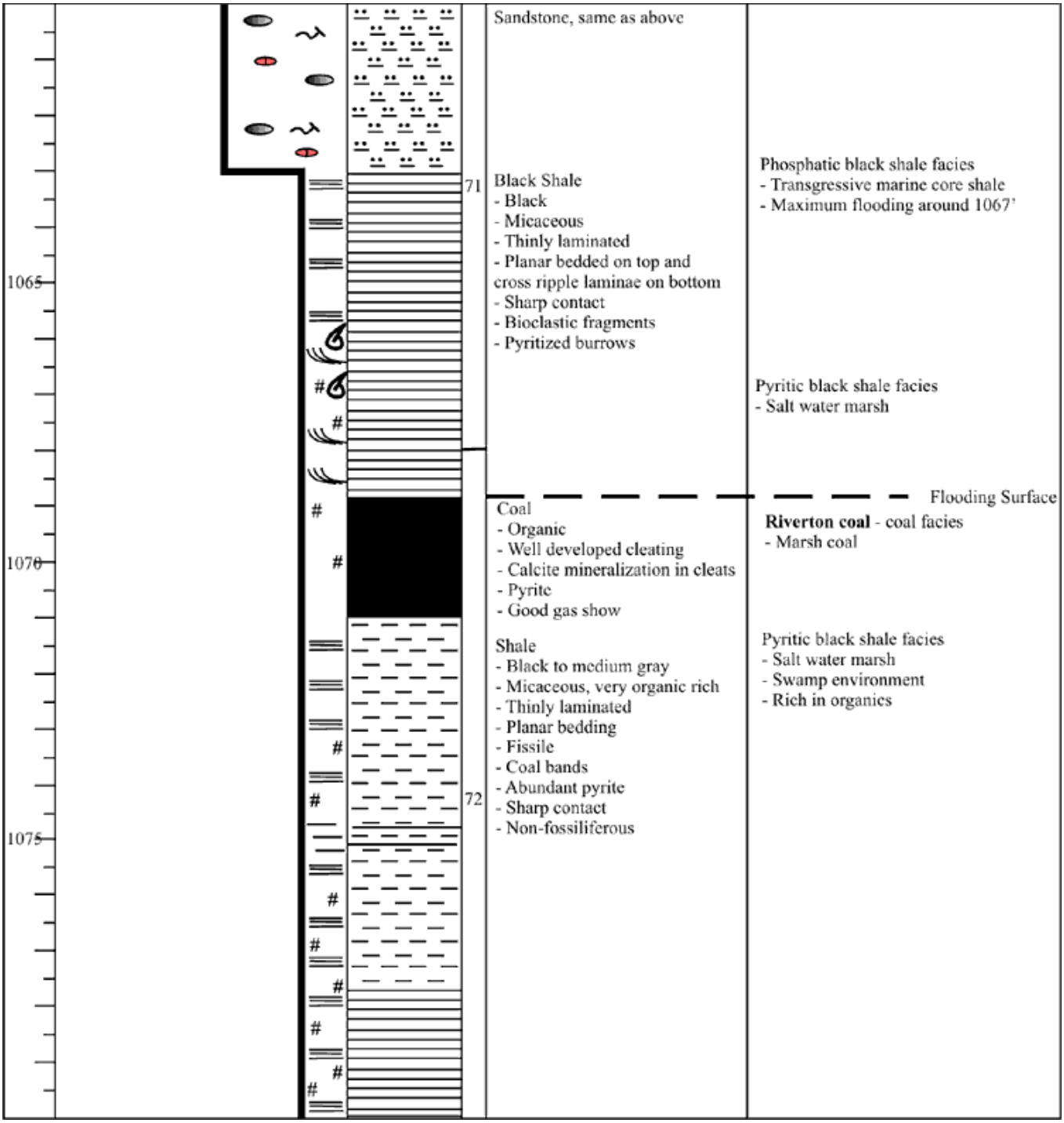

1025
1030
1035
68
69
70
Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Fissile
- Planar bedded
- Sparse siderite
- Gradational contact
- Non-fossiliferous
Sideritic gray shale facies
- Nearshore outside shale
Flooding surface
Lost core
Possible paleosol in lost portion of core
Exposure surface
Underclay
- Gray
- Hard, Pedogenic
- Plant fragments
- Siderite nodules
- Gradational contact
- Burrowing
Blocky mudstone facies
- Paleosol
Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Planar bedded
- Fissile
- Siderite in lower portion
- Gradational contact
Sideritic gray shale facies
- Estuarine - central basin
Brachiopod fragments
Transgressive lag
Flooding surface
Shale
- Dark brown
- Micaceous
- Thinly laminated
- Planar bedded
- Fissile
- Siderite
- Gradational contact
- Bioturbated
Sideritic gray shale facies
- Estuarine - central basin

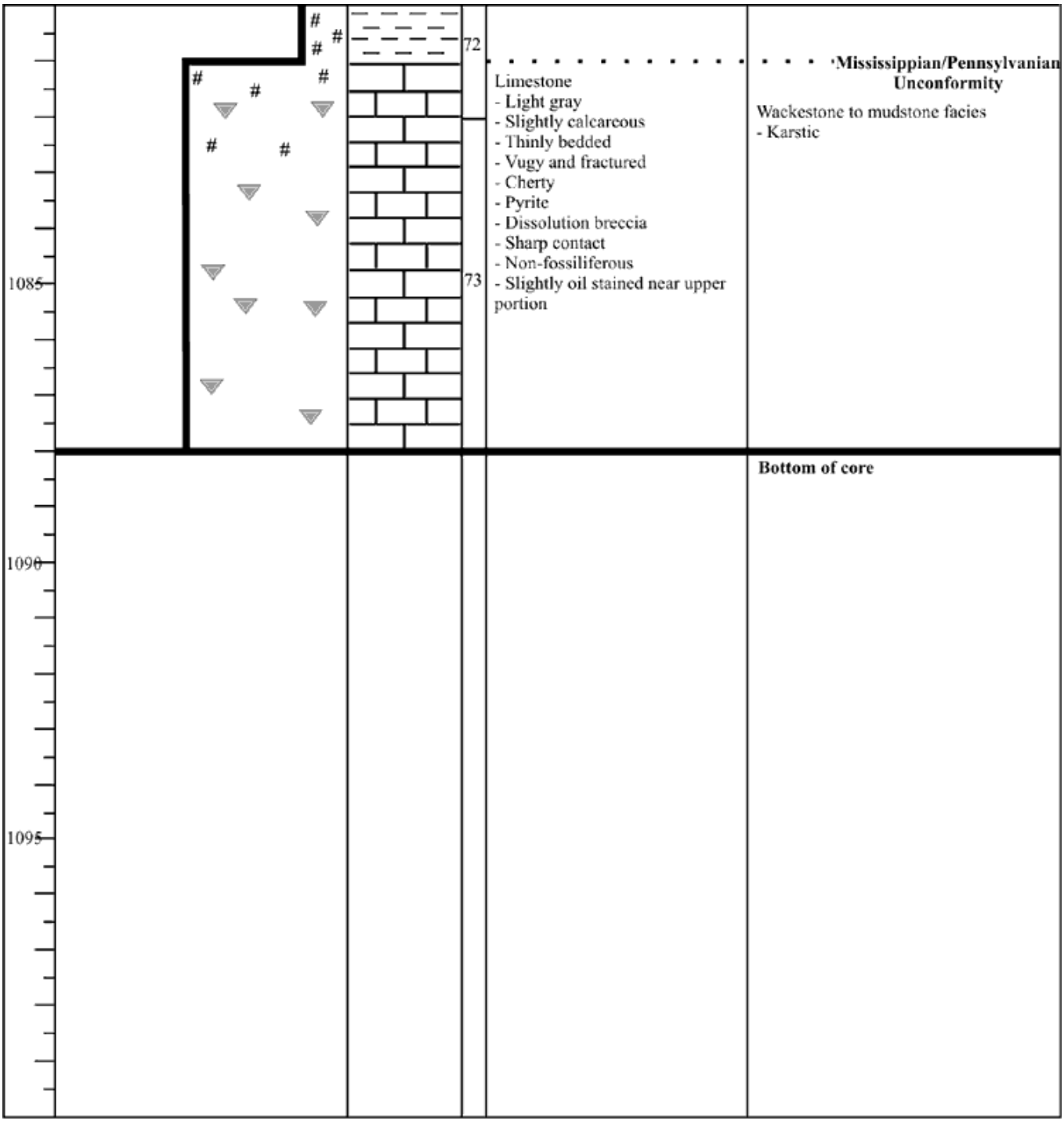


Sandstone
- Siliceous with micaceous laminae
- Very fine-grained, well sorted and well rounded
- Thickly laminated
- Wavy bedded in upper half and lenticular bedded on bottom half
- Starved wave ripples
- Siderite bands
- Syneresis cracks
- Slumping
- Gradational contact
- Arenicolites and Diplocraterion burrows

Warner Sandstone

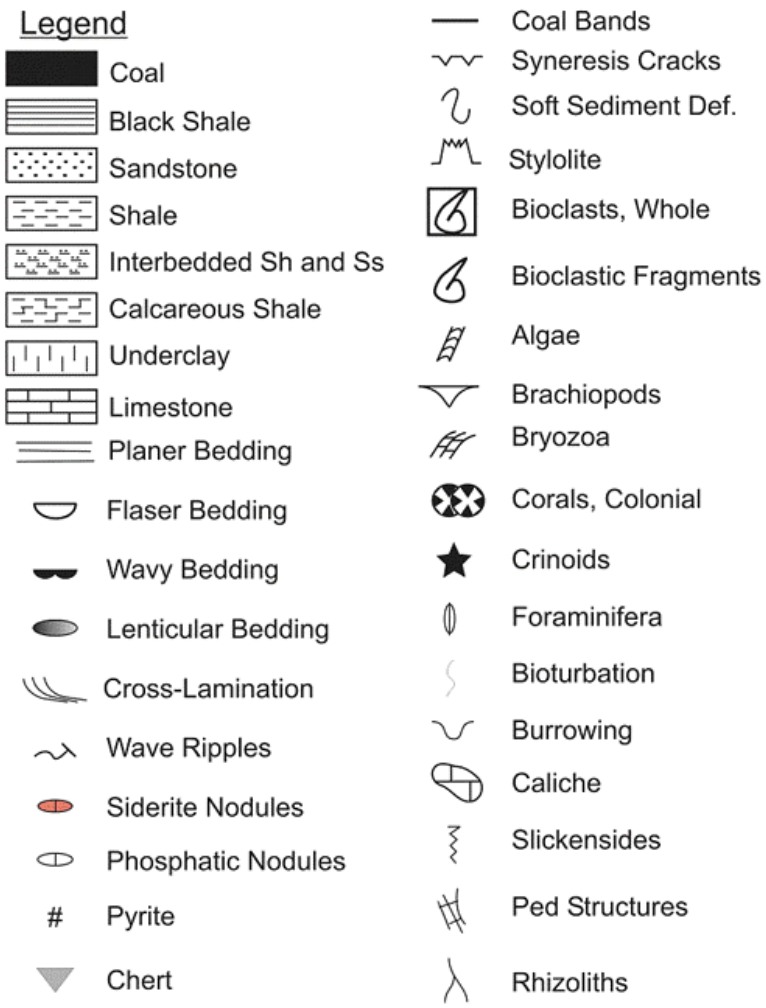
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Incised valley fill
- Bimodal flow
- There are several 1-5cm silting upward packages representing tidal cycles
- Low trace fossil diversity indicates a stressed environment


1065
1070
1075
71
72
Sandstone, same as above
Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedded on top and cross ripple laminae on bottom
- Sharp contact
- Bioclastic fragments
- Pyritized burrows
Coal
- Organic
- Well developed cleating
- Calcite mineralization in cleats
- Pyrite
- Good gas show
Shale
- Black to medium gray
- Micaceous, very organic rich
- Thinly laminated
- Planar bedding
- Fissile
- Coal bands
- Abundant pyrite
- Sharp contact
- Non-fossiliferous
Phosphatic black shale facies
- Transgressive marine core shale
- Maximum flooding around 1067'
Pyritic black shale facies
- Salt water marsh
Flooding Surface
Riverton coal - coal facies
- Marsh coal
Pyritic black shale facies
- Salt water marsh
- Swamp environment
- Rich in organics


72
73
1085
1090
1095
Limestone
- Light gray
- Slightly calcareous
- Thinly bedded
- Vugy and fractured
- Cherty
- Pyrite
- Dissolution breccia
- Sharp contact
- Non-fossiliferous
- Slightly oil stained near upper portion
Mississippian/Pennsylvanian Unconformity
Wackestone to mudstone facies
- Karstic
Bottom of core

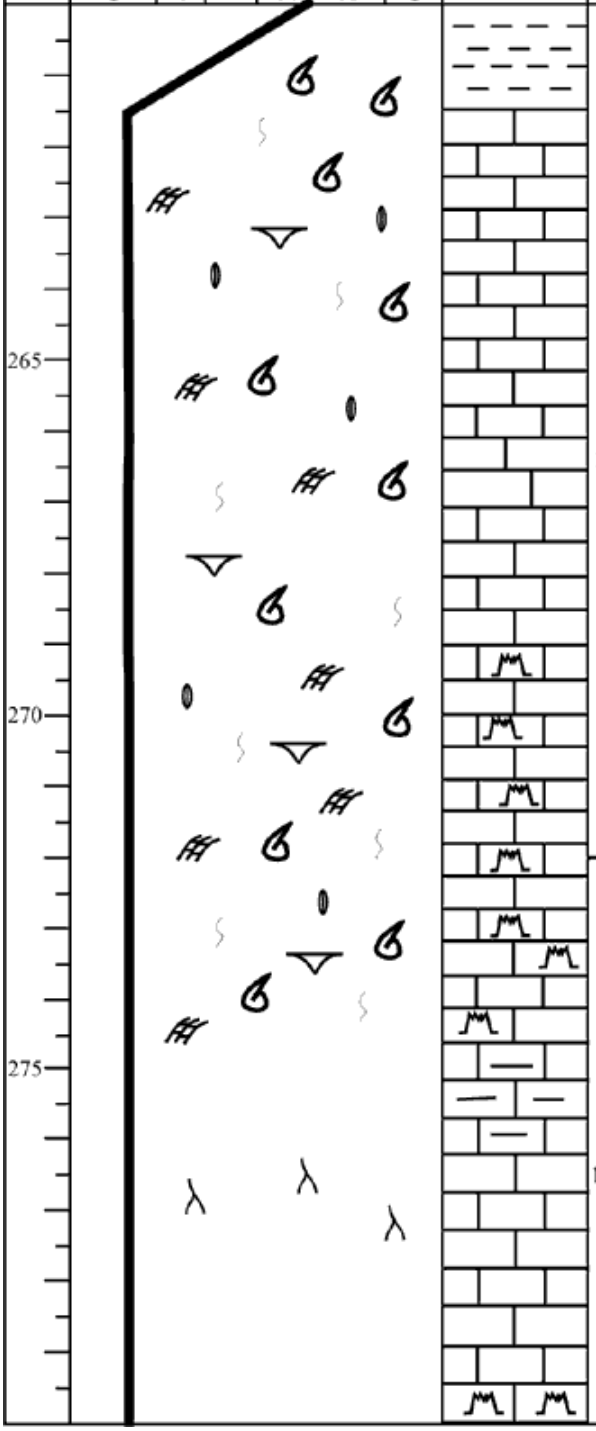
Appendix 1: Descriptions of Core

Cooper CW#1
Kansas Geological Survey
SE SW SW 11-T35S-R18E



NAME COOPER CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SW SW 11-T35S-R18E DESCRIBED BY: JONATHAN LANGE



BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JANUARY 2003

UNIT: Fort Scott

PAGE 01 OF 30 PAGES

REMARKS, INTERPRETATION

17

Limestone
- Light gray to tan
- Calcareous
- Medium bedded
- Stylolites, and horse tail stylolites
- Calcite veins
- Rooting
- Gradational upper contact
- Bioclasts of brachiopods, crinoids, fusilinids, and bryozoa
- Bioturbated

Top of Fort Scott - Higginsville Limestone

Bioclastic packstone facies
- Open marine
- Above wave base
- Shoaling upward sequence

Heavily fractured with calcite crystals

Flooding surface

Exposure surface

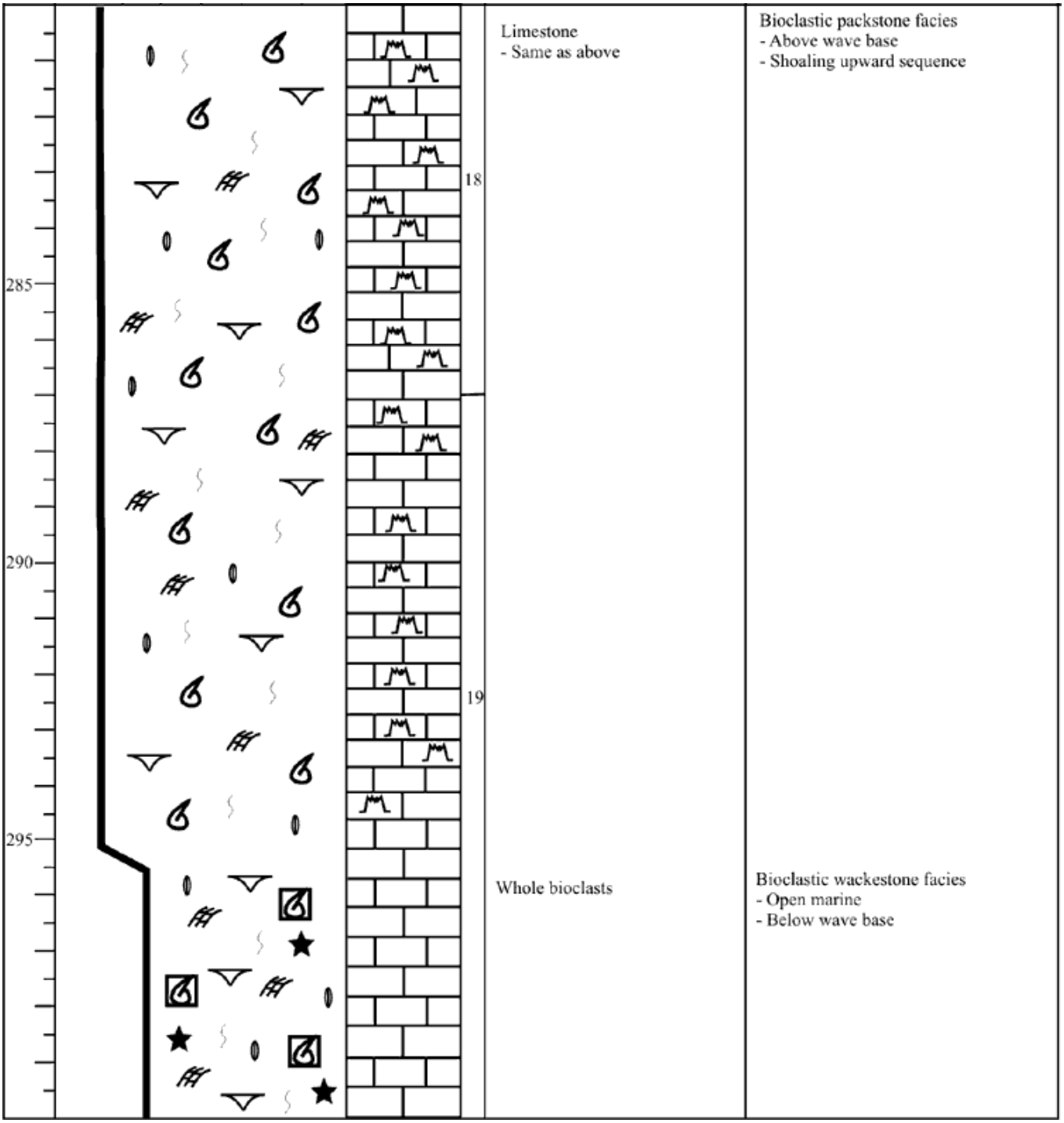
18

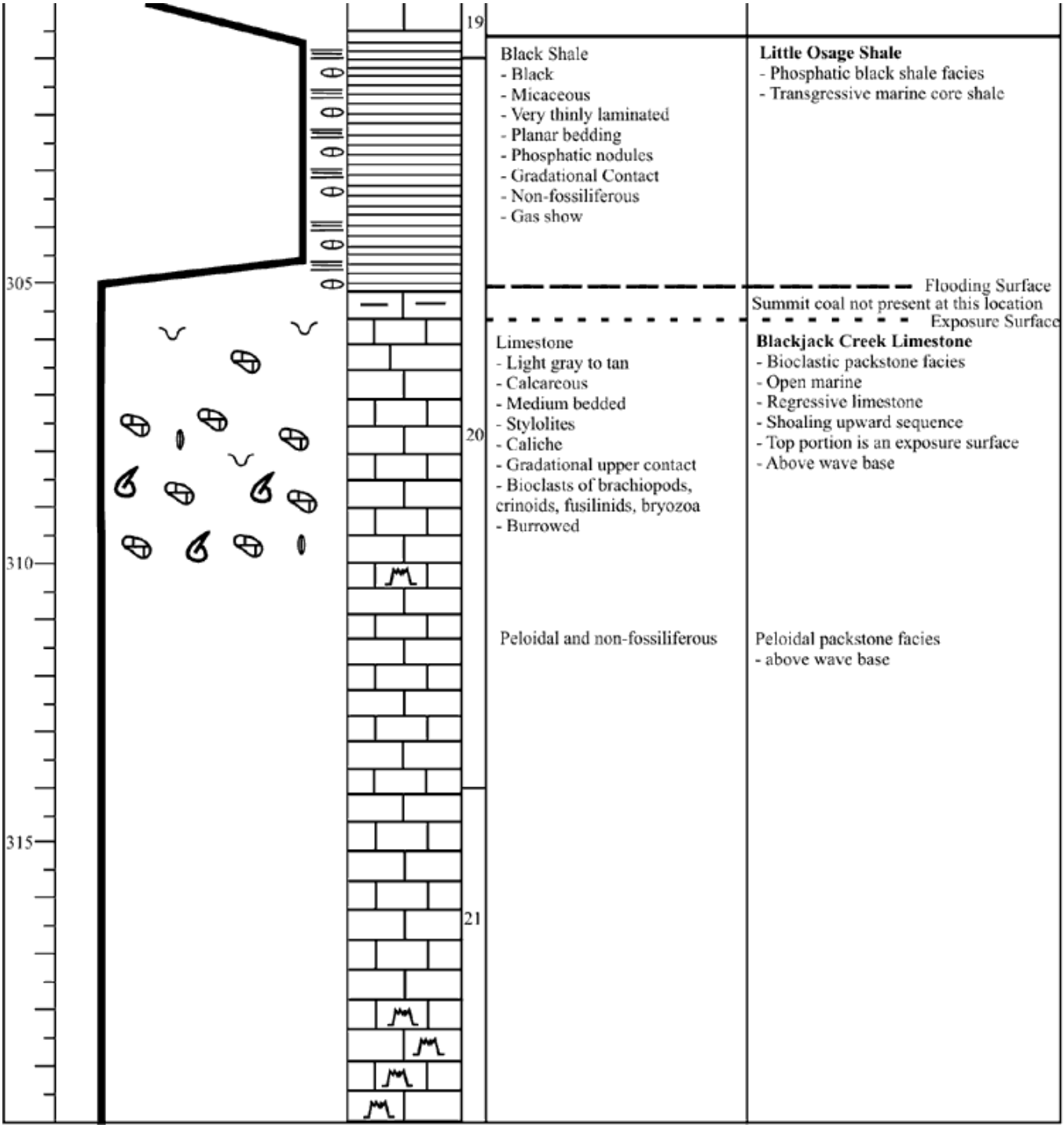
Shale parting

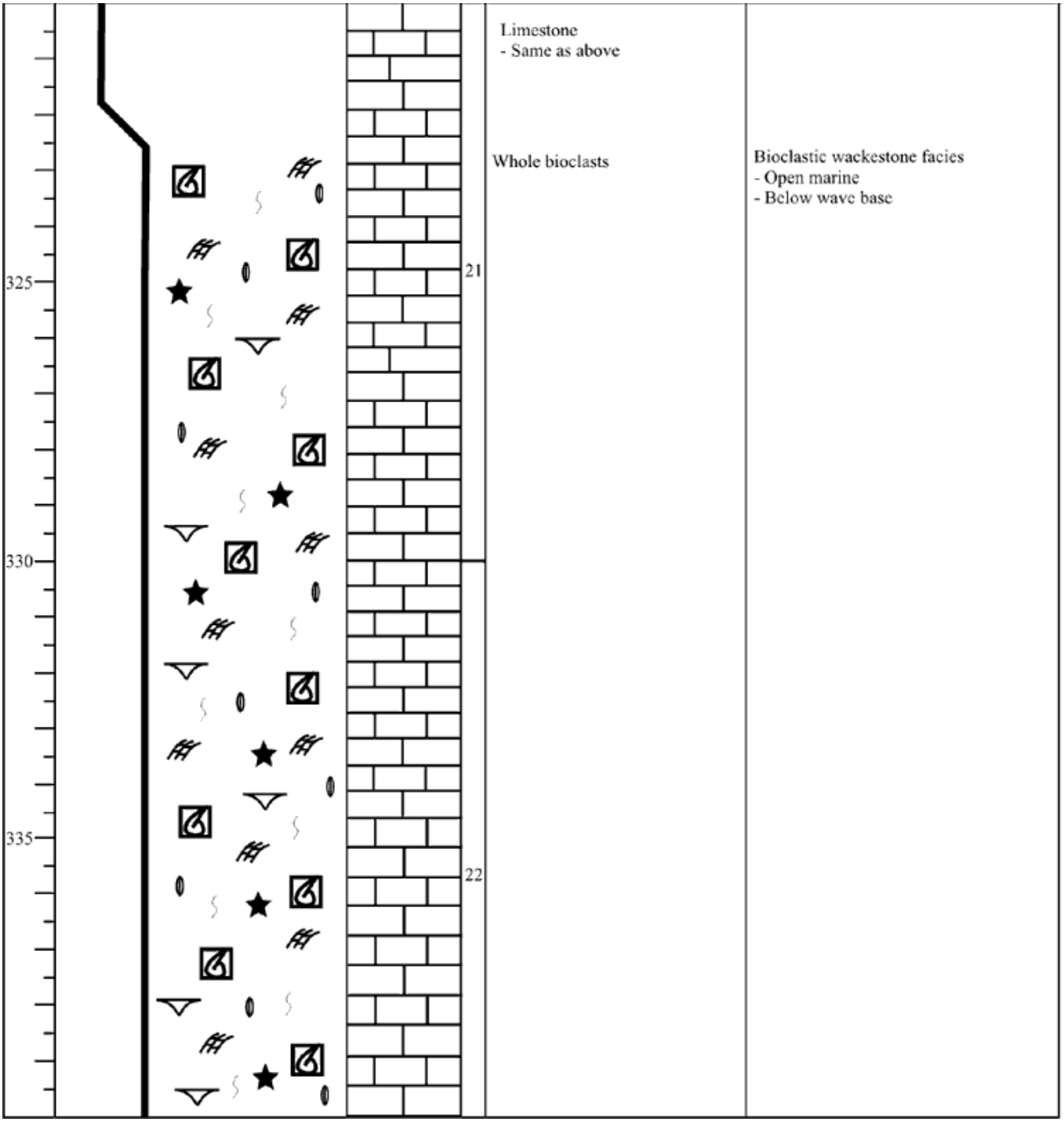
Rip-up clasts and rooting

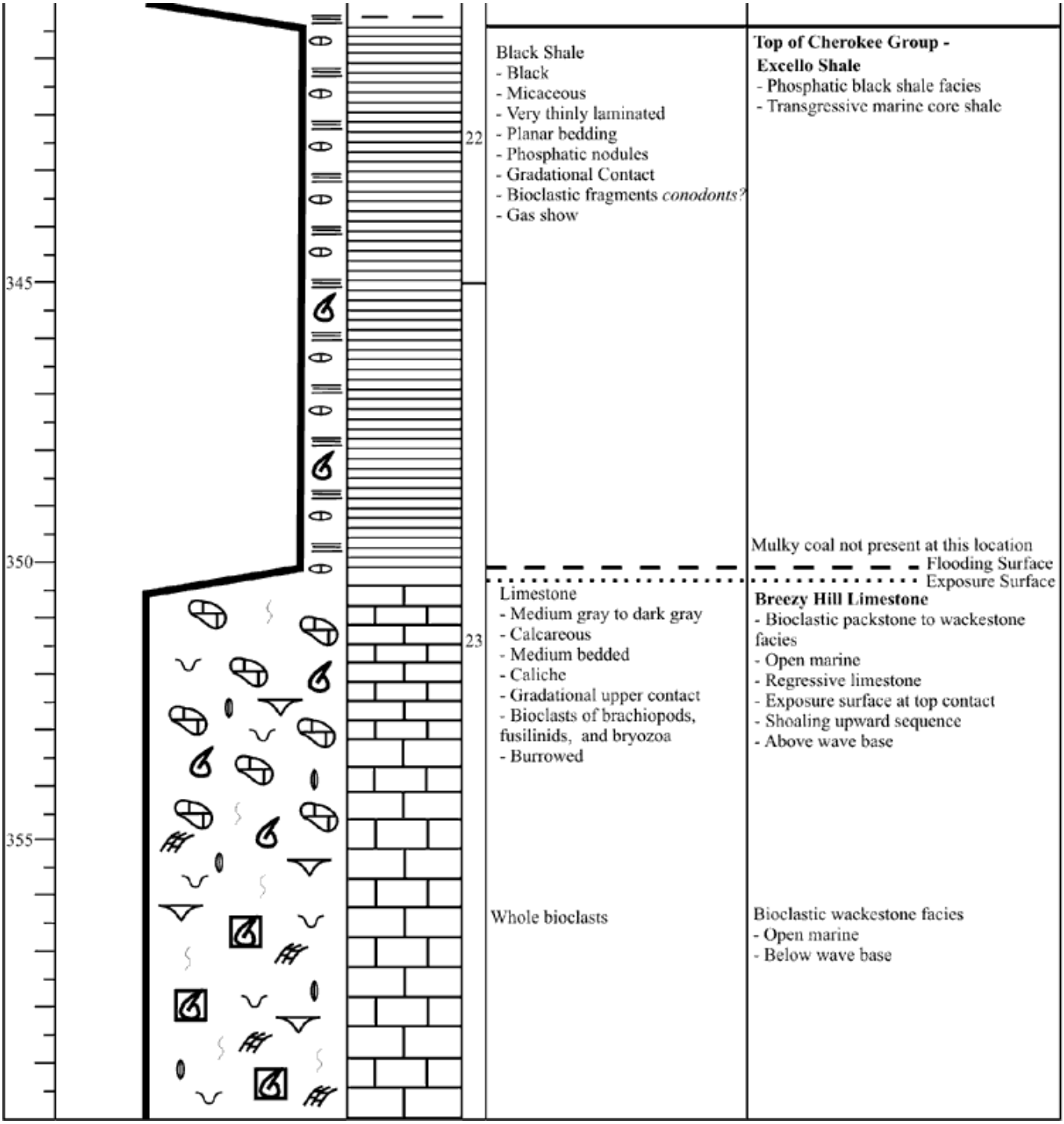
Peloidal and nonfossiliferous

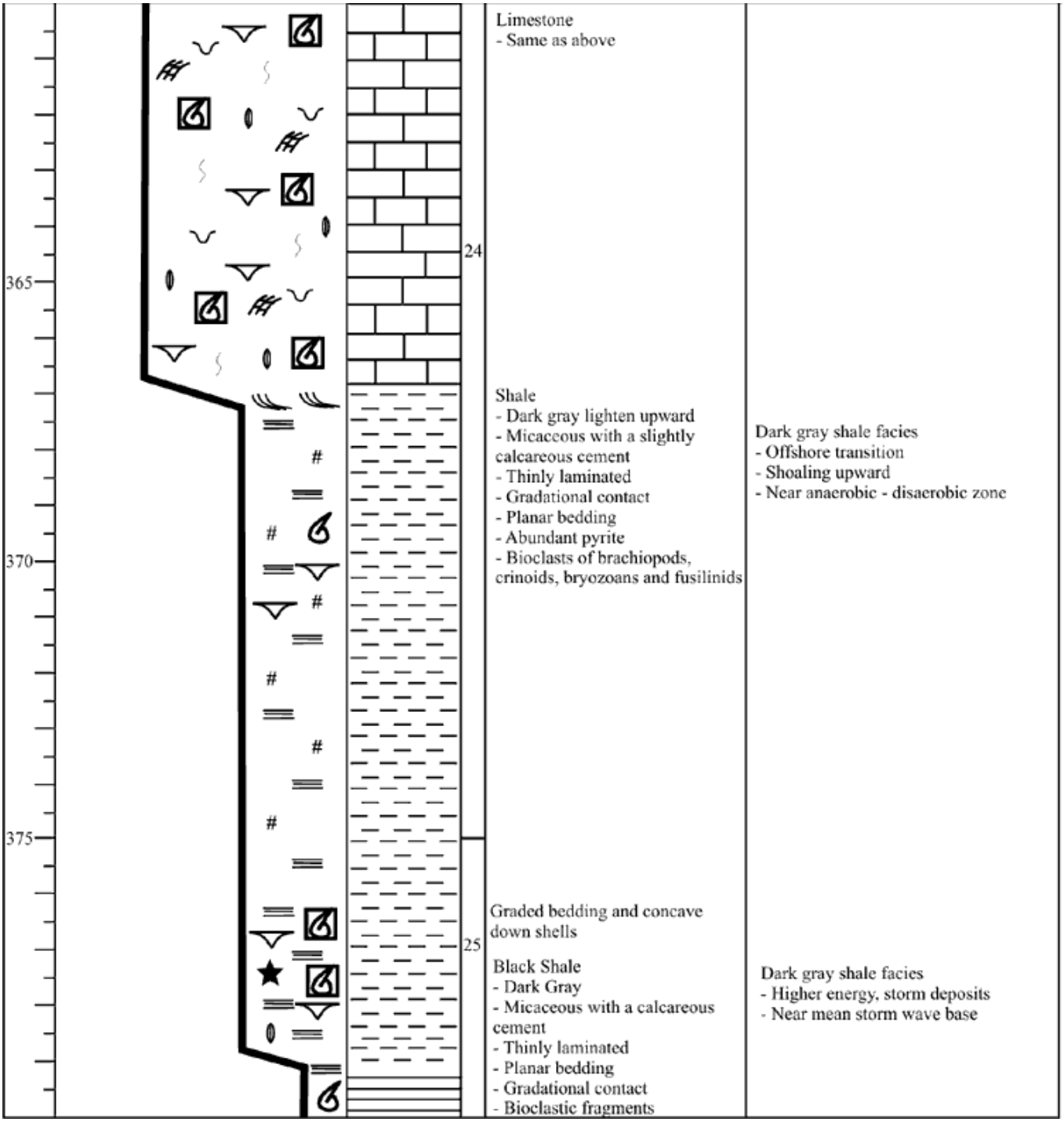
Peloidal packstone facies
- Open marine
- Above wave base

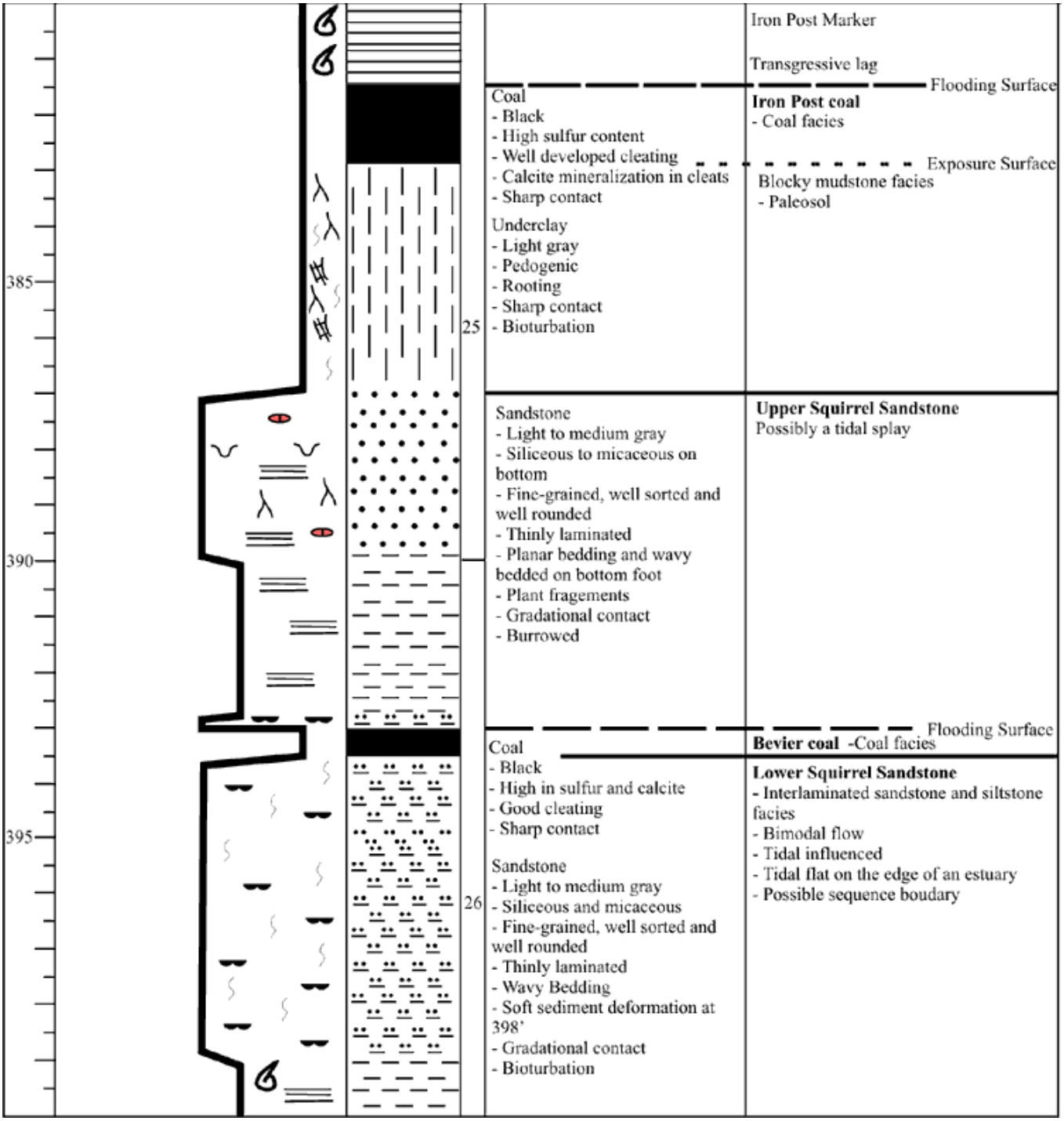

285
290
295
18
19
Limestone
- Same as above
Whole bioclasts
Bioclastic packstone facies
- Above wave base
- Shoaling upward sequence
Bioclastic wackestone facies
- Open marine
- Below wave base

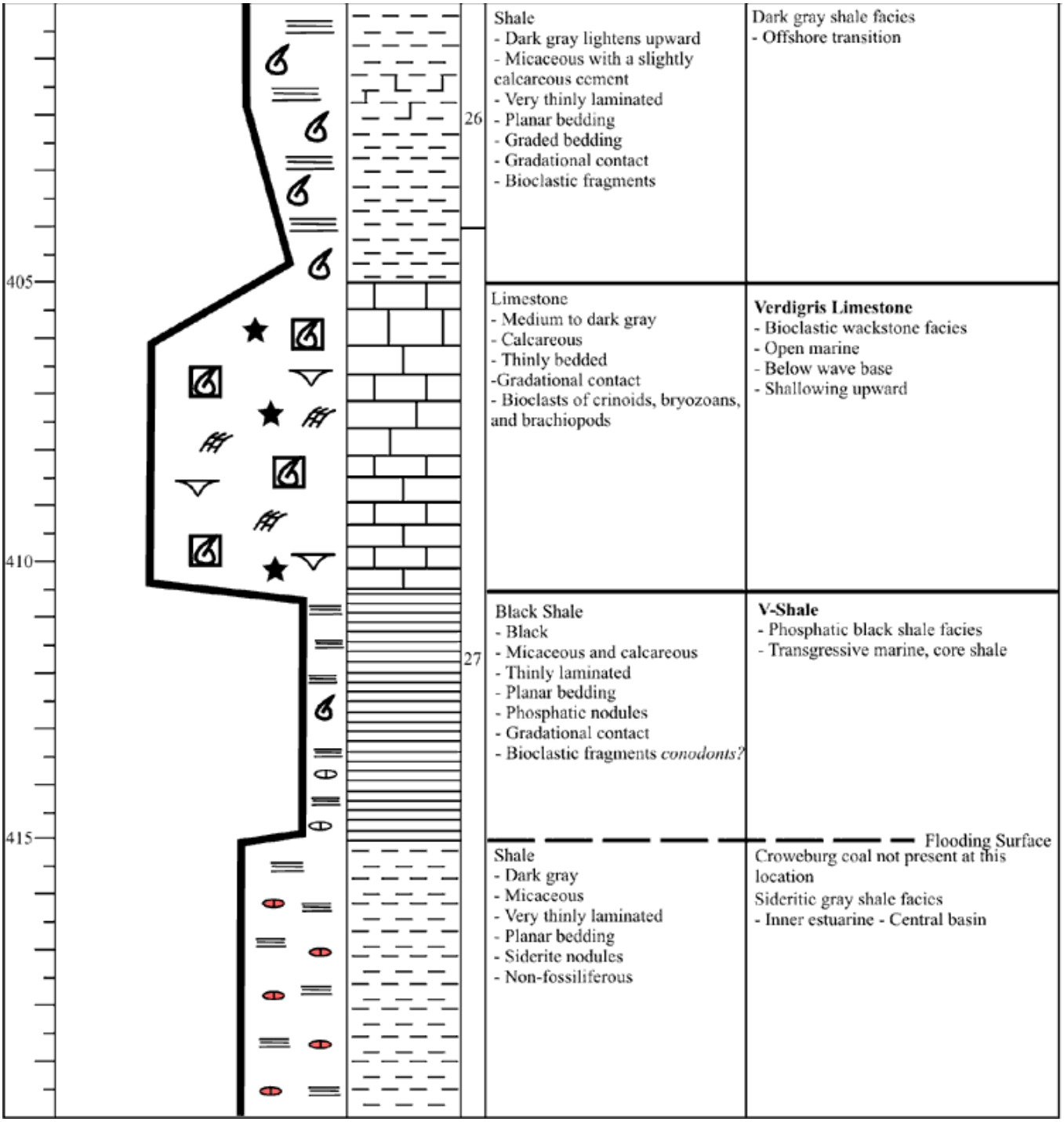

19
20
21
305
310
315
Black Shale
- Black
- Micaceous
- Very thinly laminated
- Planar bedding
- Phosphatic nodules
- Gradational Contact
- Non-fossiliferous
- Gas show
Little Osage Shale
- Phosphatic black shale facies
- Transgressive marine core shale
Flooding Surface
Summit coal not present at this location
Exposure Surface
Limestone
- Light gray to tan
- Calcareous
- Medium bedded
- Stylolites
- Caliche
- Gradational upper contact
- Bioclasts of brachiopods, crinoids, fusilinids, bryozoa
- Burrowed
Blackjack Creek Limestone
- Bioclastic packstone facies
- Open marine
- Regressive limestone
- Shoaling upward sequence
- Top portion is an exposure surface
- Above wave base
Peloidal and non-fossiliferous
Peloidal packstone facies
- above wave base

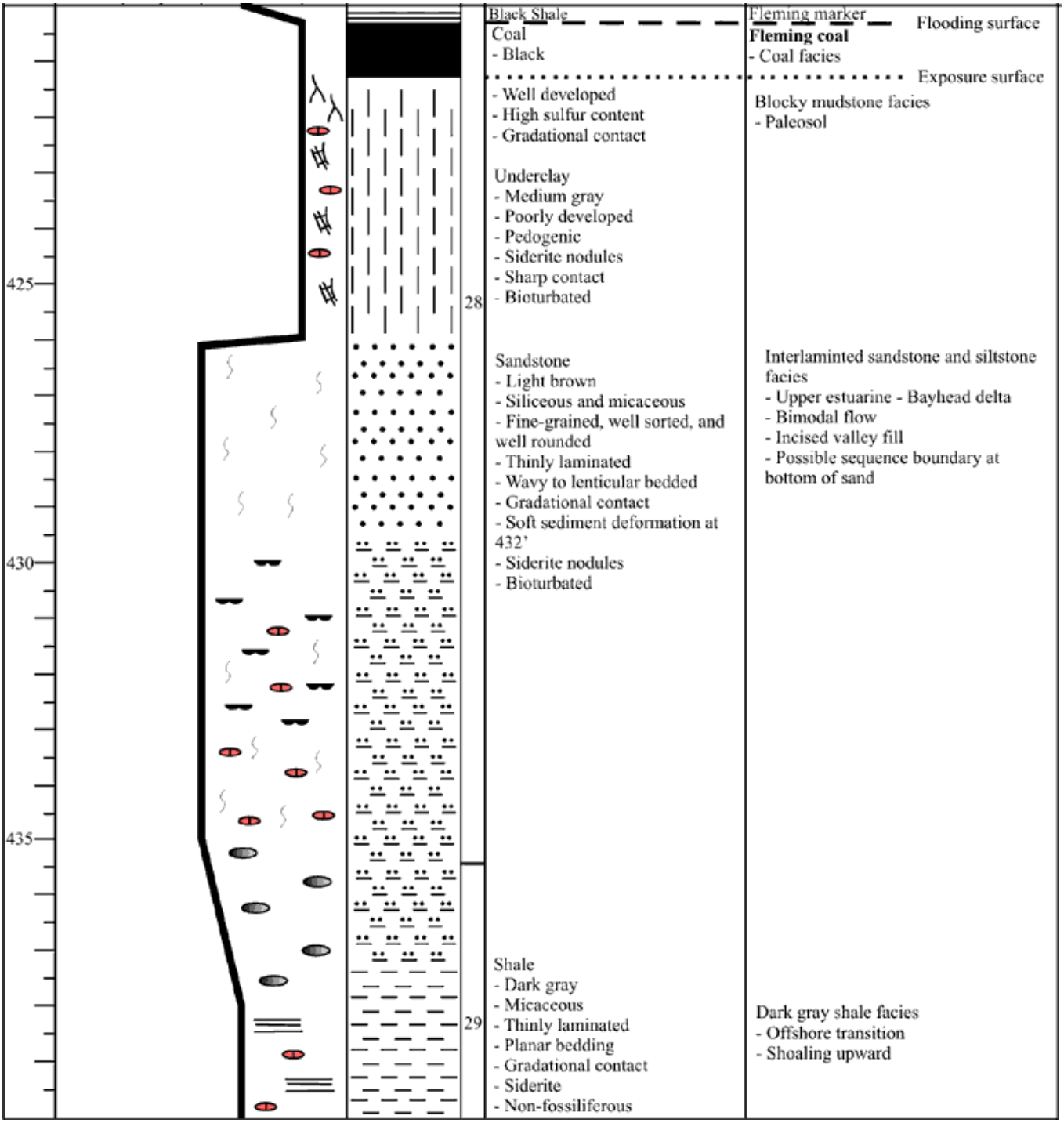

325
330
335
21
22
Limestone
- Same as above
Whole bioclasts
Bioclastic wackestone facies
- Open marine
- Below wave base

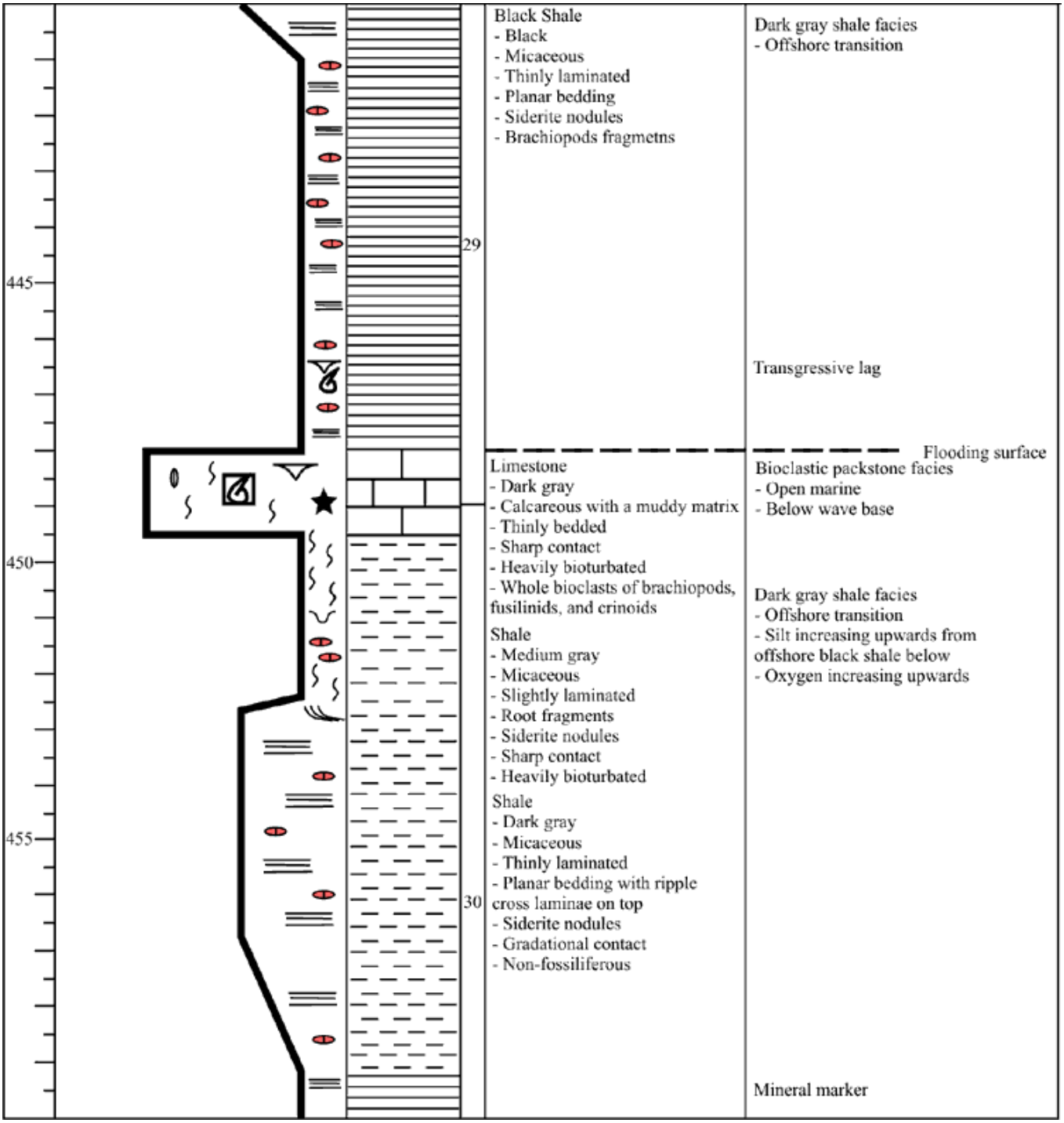

345
350
355
22
23
Black Shale
- Black
- Micaceous
- Very thinly laminated
- Planar bedding
- Phosphatic nodules
- Gradational Contact
- Bioclastic fragments *conodonts?*
- Gas show
Top of Cherokee Group -
Excello Shale
- Phosphatic black shale facies
- Transgressive marine core shale
Mulky coal not present at this location
Flooding Surface
Exposure Surface
Limestone
- Medium gray to dark gray
- Calcareous
- Medium bedded
- Caliche
- Gradational upper contact
- Bioclasts of brachiopods, fusilinids, and bryozoa
- Burrowed
Breezy Hill Limestone
- Bioclastic packstone to wackestone facies
- Open marine
- Regressive limestone
- Exposure surface at top contact
- Shoaling upward sequence
- Above wave base
Whole bioclasts
Bioclastic wackestone facies
- Open marine
- Below wave base

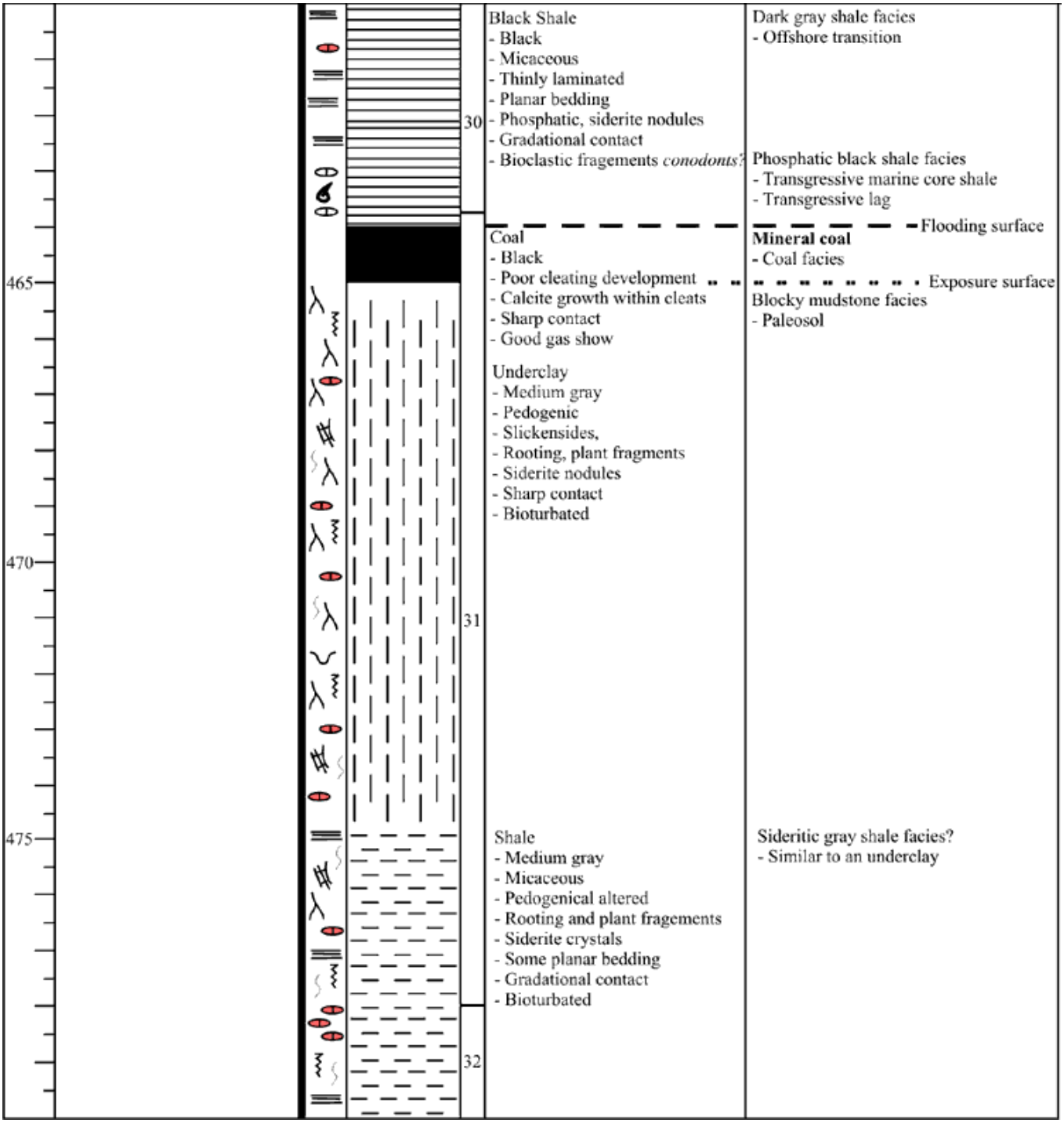

365
370
375
24
25
Limestone
- Same as above
Shale
- Dark gray lighten upward
- Micaceous with a slightly calcareous cement
- Thinly laminated
- Gradational contact
- Planar bedding
- Abundant pyrite
- Bioclasts of brachiopods, crinoids, bryozoans and fusilinids
Dark gray shale facies
- Offshore transition
- Shoaling upward
- Near anaerobic - disaerobic zone
Graded bedding and concave down shells
Black Shale
- Dark Gray
- Micaceous with a calcareous cement
- Thinly laminated
- Planar bedding
- Gradational contact
- Bioclastic fragments
Dark gray shale facies
- Higher energy, storm deposits
- Near mean storm wave base

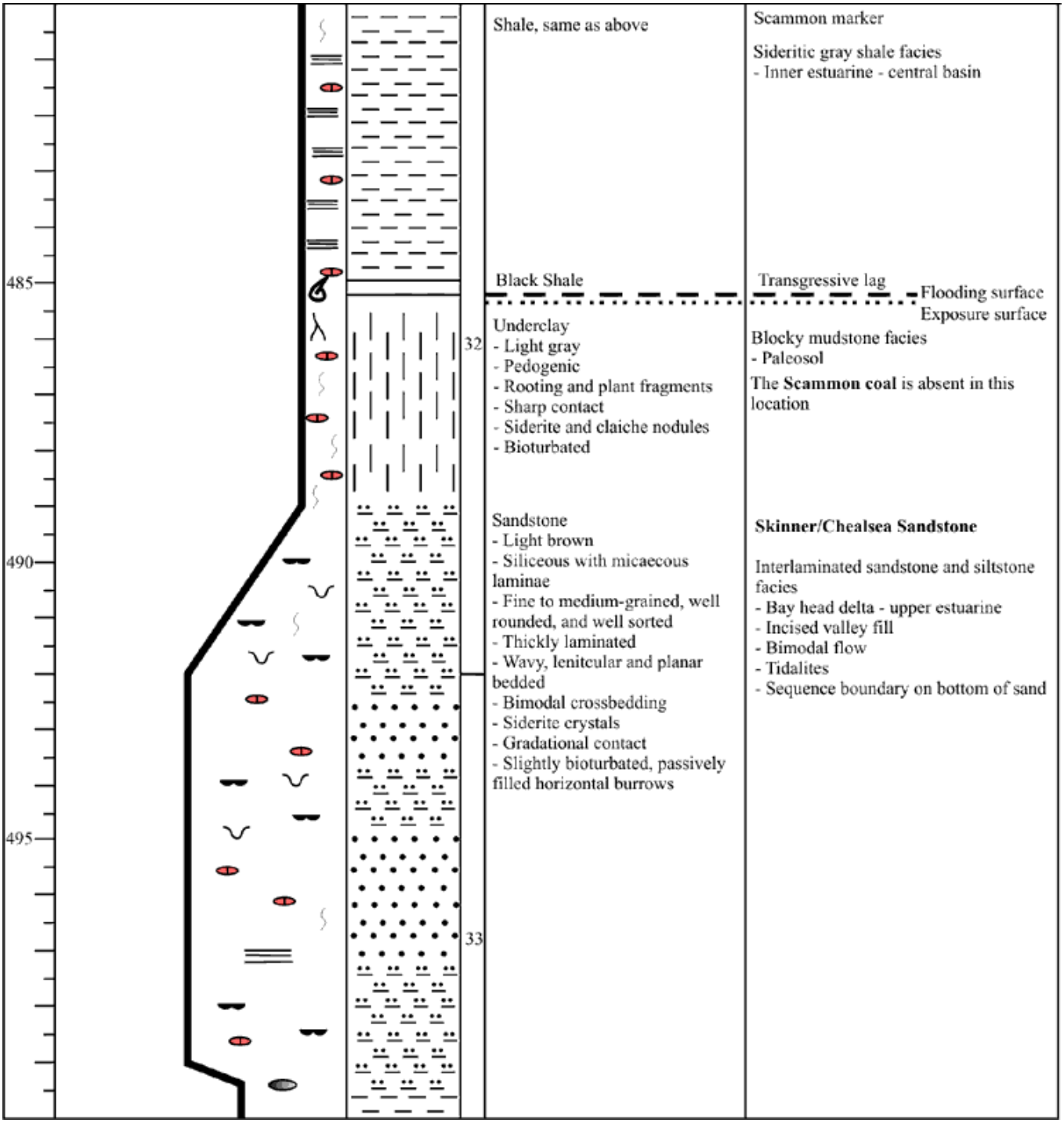

385
390
395
25
26
Iron Post Marker
Transgressive lag
Flooding Surface
Coal
- Black
- High sulfur content
- Well developed cleating
- Calcite mineralization in cleats
- Sharp contact
Iron Post coal
- Coal facies
Exposure Surface
Blocky mudstone facies
- Paleosol
Underclay
- Light gray
- Pedogenic
- Rooting
- Sharp contact
- Bioturbation
Sandstone
- Light to medium gray
- Siliceous to micaceous on bottom
- Fine-grained, well sorted and well rounded
- Thinly laminated
- Planar bedding and wavy bedded on bottom foot
- Plant fragements
- Gradational contact
- Burrowed
Upper Squirrel Sandstone
Possibly a tidal splay
Flooding Surface
Bevier coal -Coal facies
Coal
- Black
- High in sulfur and calcite
- Good cleating
- Sharp contact
Lower Squirrel Sandstone
- Interlaminated sandstone and siltstone facies
- Bimodal flow
- Tidal influenced
- Tidal flat on the edge of an estuary
- Possible sequence boudary
Sandstone
- Light to medium gray
- Siliceous and micaceous
- Fine-grained, well sorted and well rounded
- Thinly laminated
- Wavy Bedding
- Soft sediment deformation at 398'
- Gradational contact
- Bioturbation

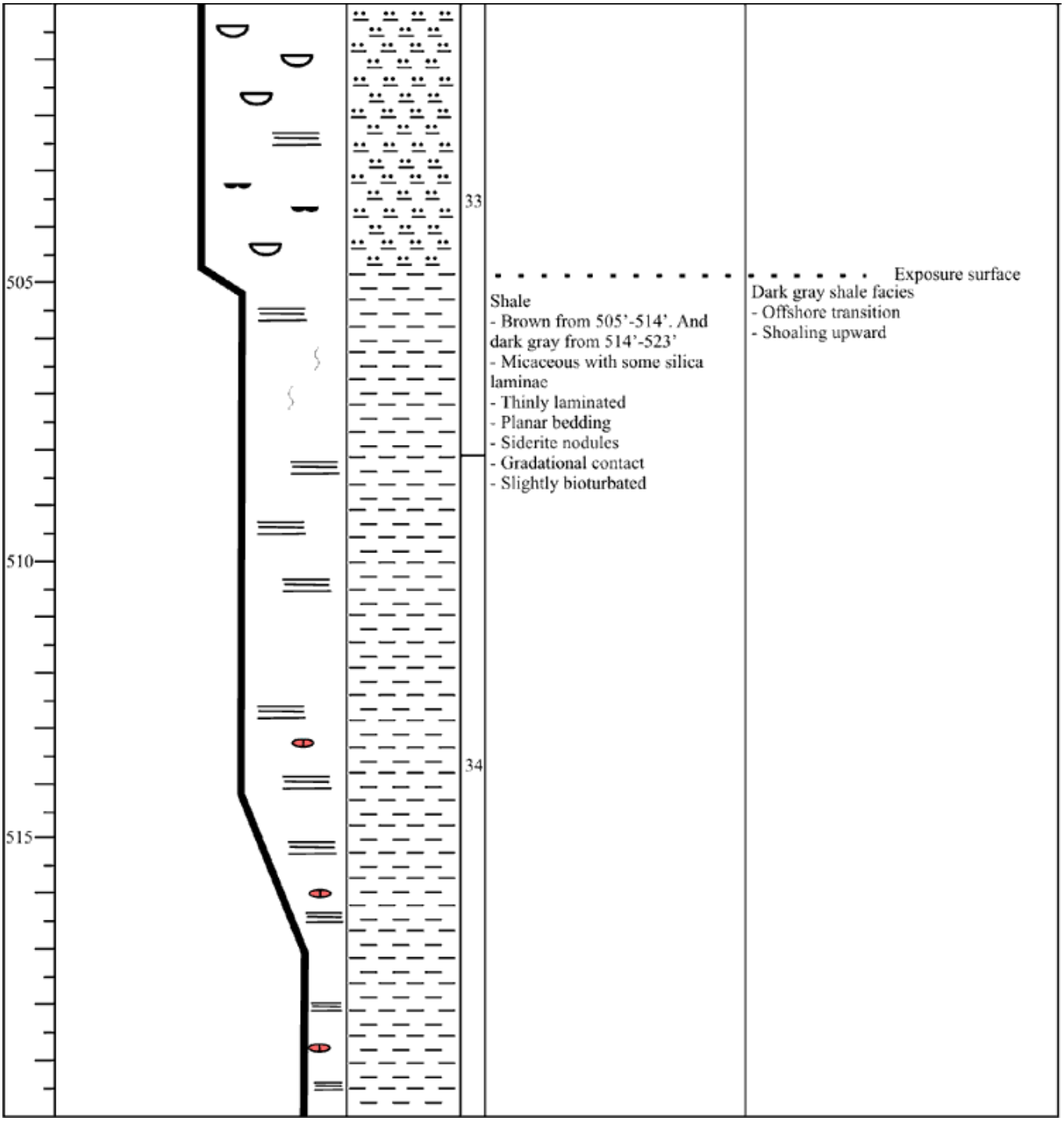

405
410
415
26
27
Shale
- Dark gray lightens upward
- Micaceous with a slightly calcareous cement
- Very thinly laminated
- Planar bedding
- Graded bedding
- Gradational contact
- Bioclastic fragments
Dark gray shale facies
- Offshore transition
Limestone
- Medium to dark gray
- Calcareous
- Thinly bedded
-Gradational contact
- Bioclasts of crinoids, bryozoans, and brachiopods
Verdigris Limestone
- Bioclastic wackstone facies
- Open marine
- Below wave base
- Shallowing upward
Black Shale
- Black
- Micaceous and calcareous
- Thinly laminated
- Planar bedding
- Phosphatic nodules
- Gradational contact
- Bioclastic fragments conodonts?
V-Shale
- Phosphatic black shale facies
- Transgressive marine, core shale
Flooding Surface
Shale
- Dark gray
- Micaceous
- Very thinly laminated
- Planar bedding
- Siderite nodules
- Non-fossiliferous
Croweburg coal not present at this location
Sideritic gray shale facies
- Inner estuarine - Central basin

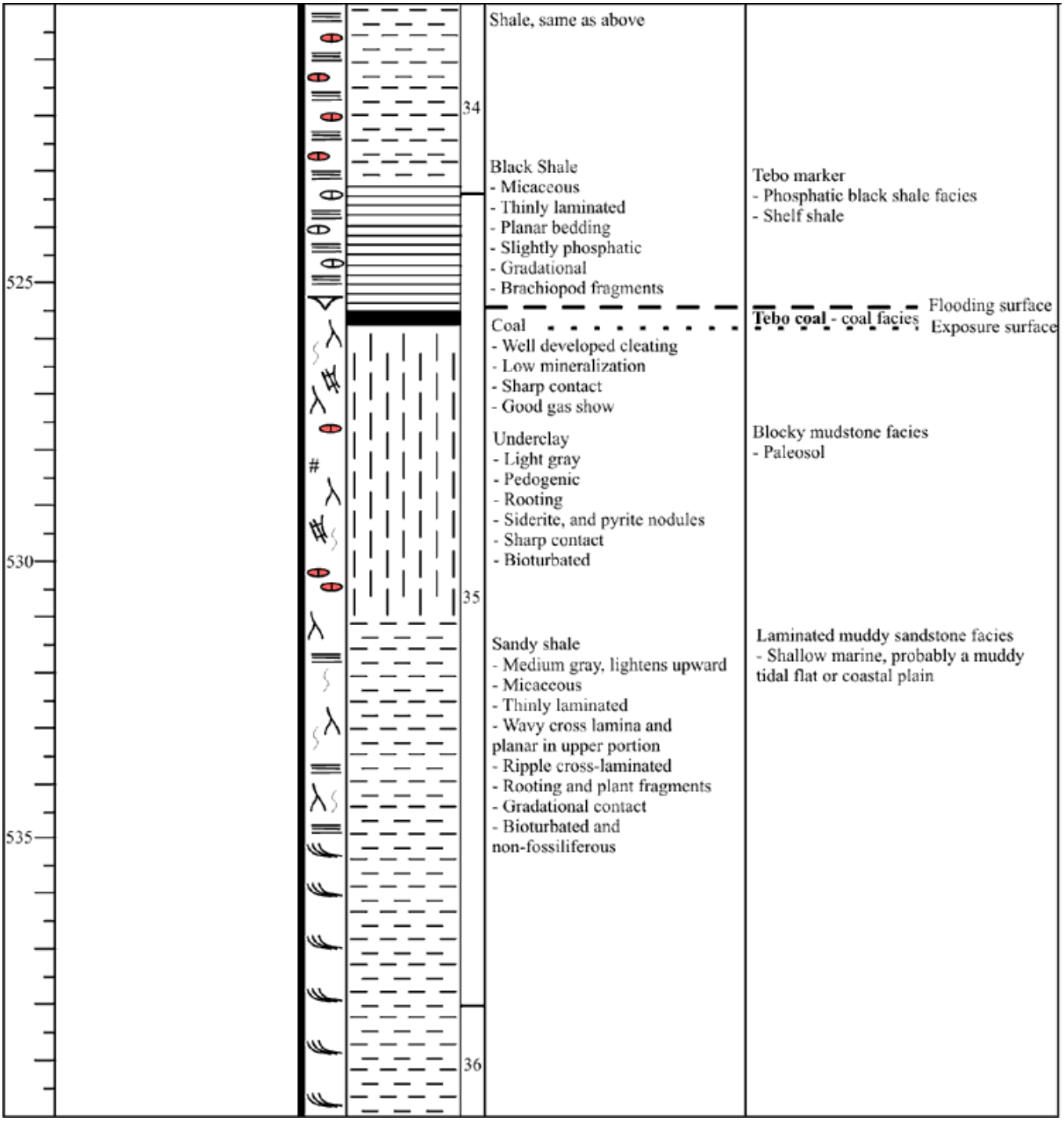

425
430
435
28
29
Black Shale
Coal
- Black
- Well developed
- High sulfur content
- Gradational contact
Underclay
- Medium gray
- Poorly developed
- Pedogenic
- Siderite nodules
- Sharp contact
- Bioturbated
Sandstone
- Light brown
- Siliceous and micaceous
- Fine-grained, well sorted, and well rounded
- Thinly laminated
- Wavy to lenticular bedded
- Gradational contact
- Soft sediment deformation at 432'
- Siderite nodules
- Bioturbated
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedding
- Gradational contact
- Siderite
- Non-fossiliferous
Fleming marker
Flooding surface
Fleming coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Interlaminted sandstone and siltstone facies
- Upper estuarine - Bayhead delta
- Bimodal flow
- Incised valley fill
- Possible sequence boundary at bottom of sand
Dark gray shale facies
- Offshore transition
- Shoaling upward

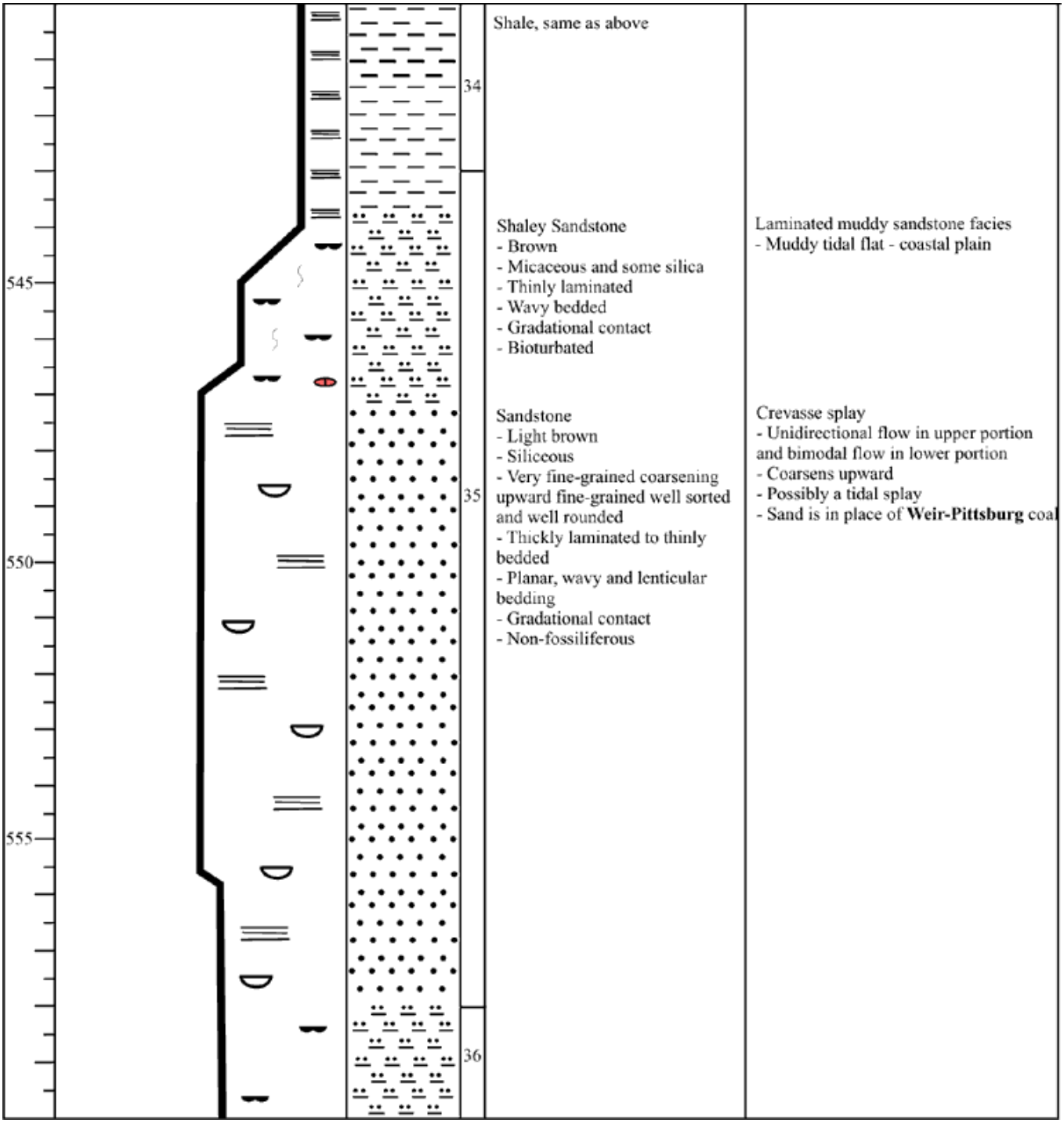

445
450
455
29
30
Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedding
- Siderite nodules
- Brachiopods fragmetns
Limestone
- Dark gray
- Calcareous with a muddy matrix
- Thinly bedded
- Sharp contact
- Heavily bioturbated
- Whole bioclasts of brachiopods, fusilinids, and crinoids
Shale
- Medium gray
- Micaceous
- Slightly laminated
- Root fragments
- Siderite nodules
- Sharp contact
- Heavily bioturbated
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedding with ripple cross laminae on top
- Siderite nodules
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
Transgressive lag
Flooding surface
Bioclastic packstone facies
- Open marine
- Below wave base
Dark gray shale facies
- Offshore transition
- Silt increasing upwards from offshore black shale below
- Oxygen increasing upwards
Mineral marker

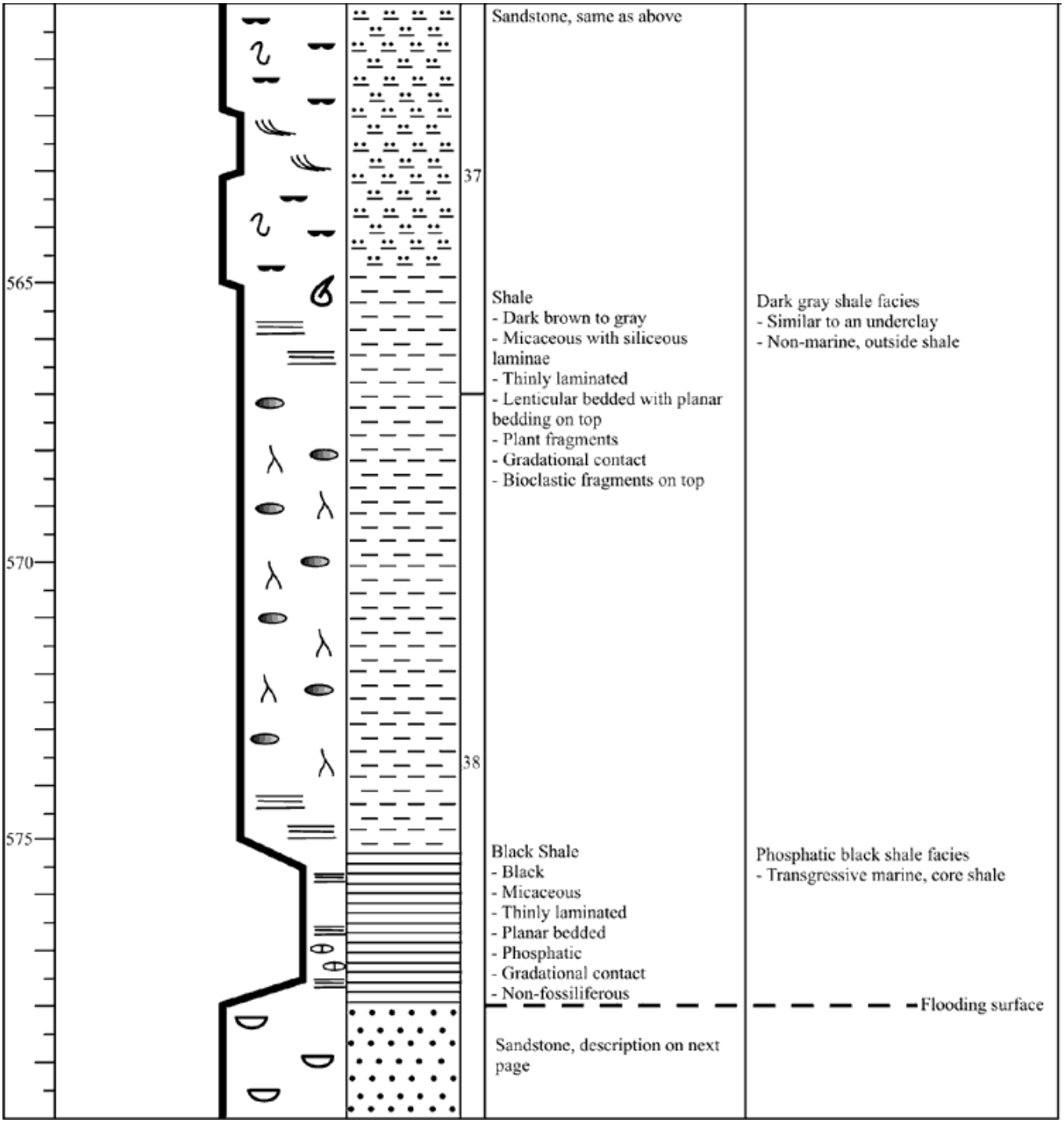

465
470
475
30
31
32
Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedding
- Phosphatic, siderite nodules
- Gradational contact
- Bioclastic fragements *conodonts*?
Coal
- Black
- Poor cleating development
- Calcite growth within cleats
- Sharp contact
- Good gas show
Underclay
- Medium gray
- Pedogenic
- Slickensides,
- Rooting, plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated
Shale
- Medium gray
- Micaceous
- Pedogenical altered
- Rooting and plant fragements
- Siderite crystals
- Some planar bedding
- Gradational contact
- Bioturbated
Dark gray shale facies
- Offshore transition
Phosphatic black shale facies
- Transgressive marine core shale
- Transgressive lag
Flooding surface
Mineral coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Sideritic gray shale facies?
- Similar to an underclay

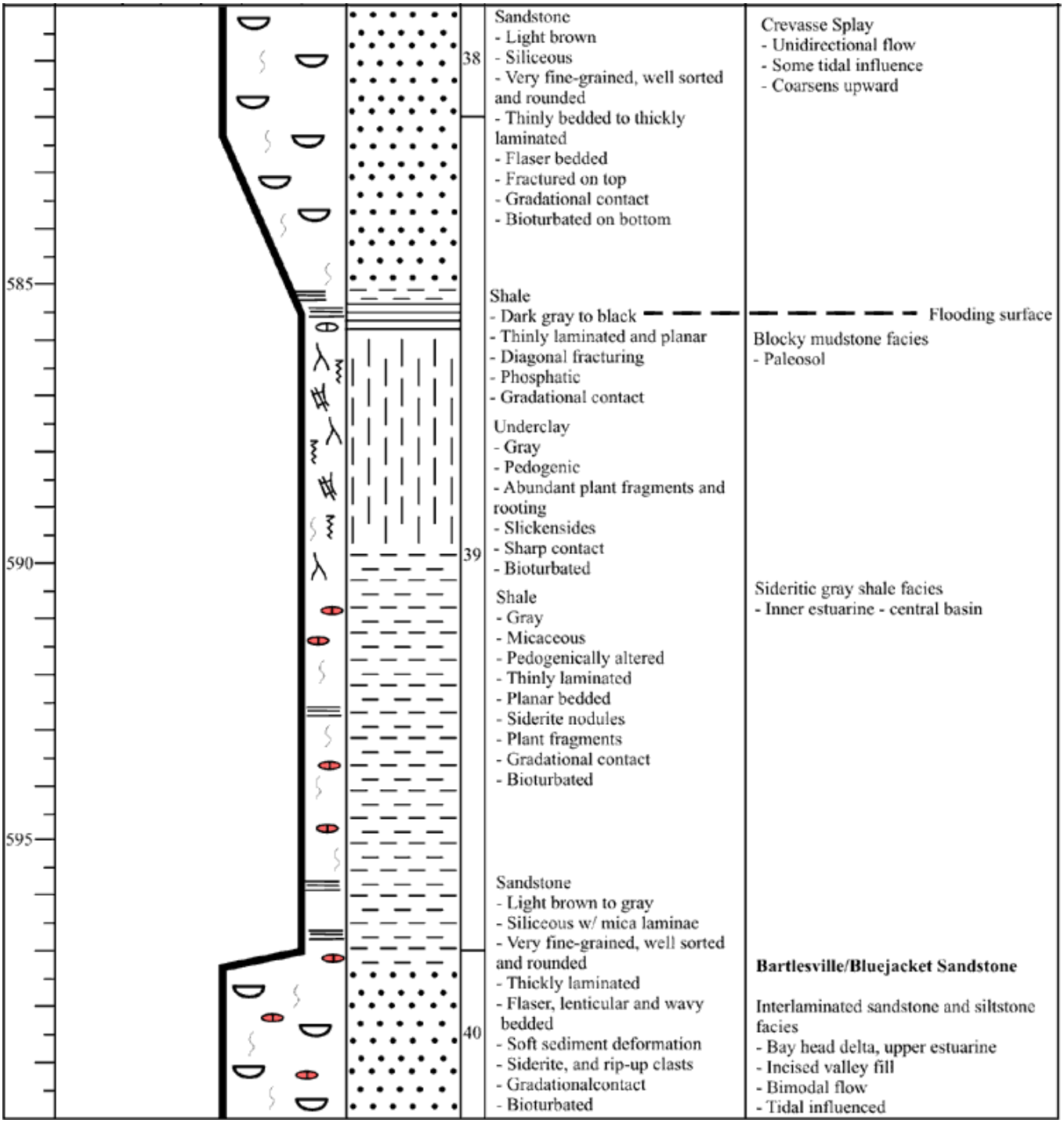

485
490
495
32
33
Shale, same as above
Black Shale
Underclay
- Light gray
- Pedogenic
- Rooting and plant fragments
- Sharp contact
- Siderite and claiche nodules
- Bioturbated
Sandstone
- Light brown
- Siliceous with micaecous laminae
- Fine to medium-grained, well rounded, and well sorted
- Thickly laminated
- Wavy, lenitcular and planar bedded
- Bimodal crossbedding
- Siderite crystals
- Gradational contact
- Slightly bioturbated, passively filled horizontal burrows
Scammon marker
Sideritic gray shale facies
- Inner estuarine - central basin
Transgressive lag
Flooding surface
Exposure surface
Blocky mudstone facies
- Paleosol
The Scammon coal is absent in this location
Skinner/Chealsea Sandstone
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Incised valley fill
- Bimodal flow
- Tidalites
- Sequence boundary on bottom of sand

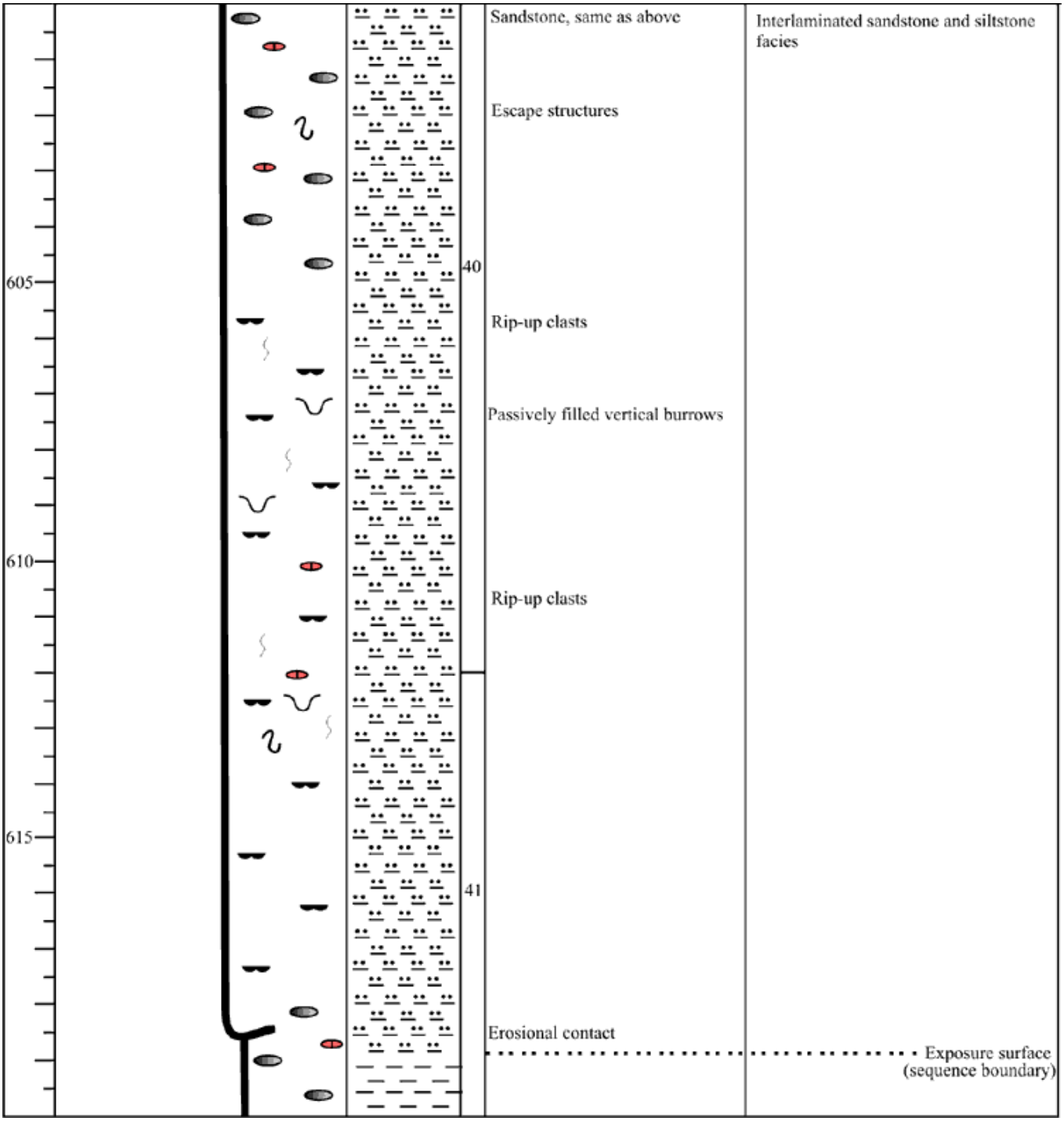

505
510
515
33
34
Exposure surface
Shale
- Brown from 505'-514'. And dark gray from 514'-523'
- Micaceous with some silica laminae
- Thinly laminated
- Planar bedding
- Siderite nodules
- Gradational contact
- Slightly bioturbated
Dark gray shale facies
- Offshore transition
- Shoaling upward

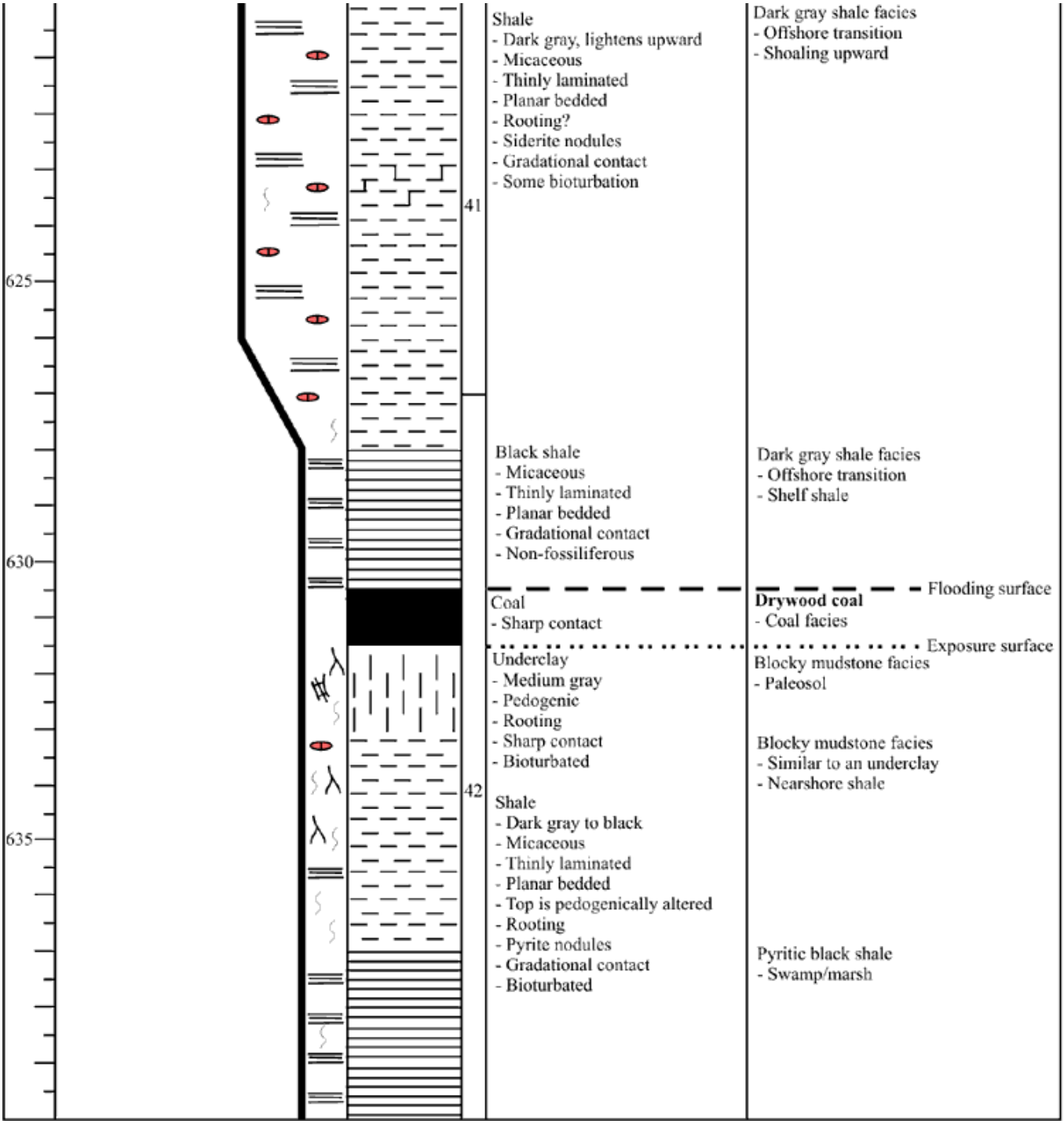

525
530
535
34
35
36
Shale, same as above
Black Shale
- Micaceous
- Thinly laminated
- Planar bedding
- Slightly phosphatic
- Gradational
- Brachiopod fragments
Coal
- Well developed cleating
- Low mineralization
- Sharp contact
- Good gas show
Underclay
- Light gray
- Pedogenic
- Rooting
- Siderite, and pyrite nodules
- Sharp contact
- Bioturbated
Sandy shale
- Medium gray, lightens upward
- Micaceous
- Thinly laminated
- Wavy cross lamina and planar in upper portion
- Ripple cross-laminated
- Rooting and plant fragments
- Gradational contact
- Bioturbated and non-fossiliferous
Tebo marker
- Phosphatic black shale facies
- Shelf shale
Flooding surface
Tebo coal - coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Laminated muddy sandstone facies
- Shallow marine, probably a muddy tidal flat or coastal plain

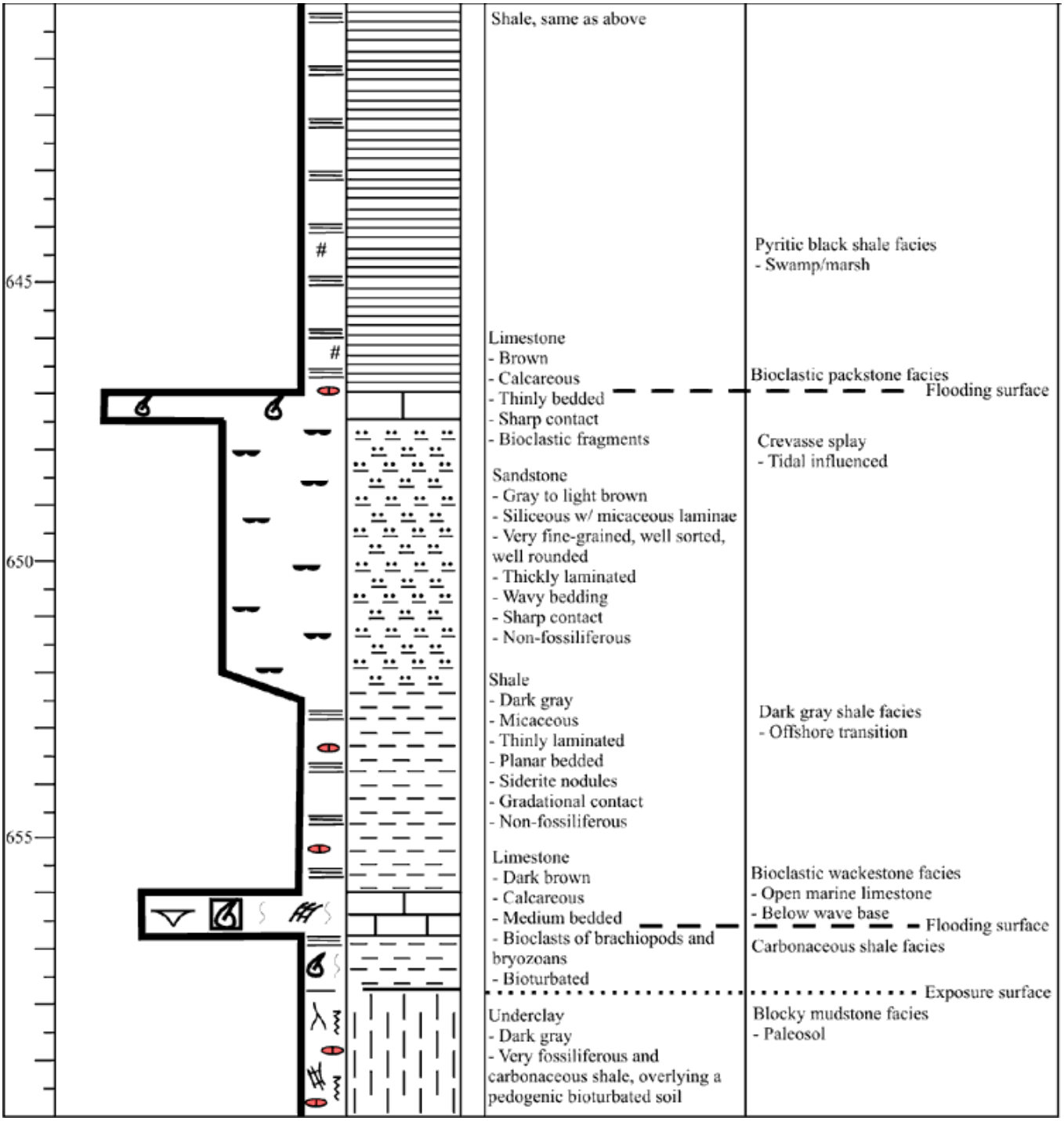

545
550
555
34
35
36
Shale, same as above
Shaley Sandstone
- Brown
- Micaceous and some silica
- Thinly laminated
- Wavy bedded
- Gradational contact
- Bioturbated
Sandstone
- Light brown
- Siliceous
- Very fine-grained coarsening upward fine-grained well sorted and well rounded
- Thickly laminated to thinly bedded
- Planar, wavy and lenticular bedding
- Gradational contact
- Non-fossiliferous
Laminated muddy sandstone facies
- Muddy tidal flat - coastal plain
Crevasse splay
- Unidirectional flow in upper portion and bimodal flow in lower portion
- Coarsens upward
- Possibly a tidal splay
- Sand is in place of **Weir-Pittsburg** coal

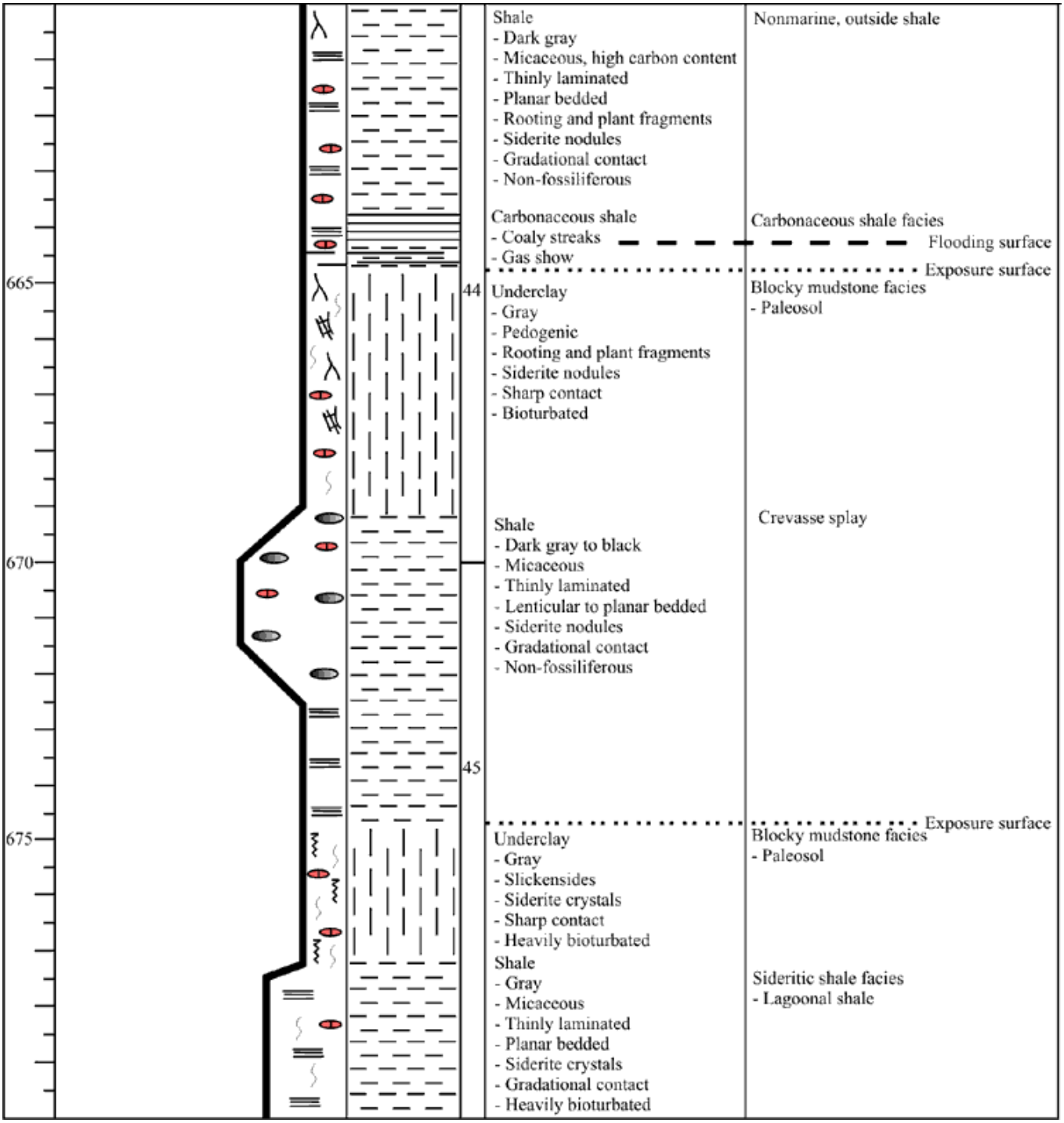

565
570
575
37
38
Sandstone, same as above
Shale
- Dark brown to gray
- Micaceous with siliceous laminae
- Thinly laminated
- Lenticular bedded with planar bedding on top
- Plant fragments
- Gradational contact
- Bioclastic fragments on top
Dark gray shale facies
- Similar to an underclay
- Non-marine, outside shale
Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedded
- Phosphatic
- Gradational contact
- Non-fossiliferous
Phosphatic black shale facies
- Transgressive marine, core shale
Flooding surface
Sandstone, description on next page

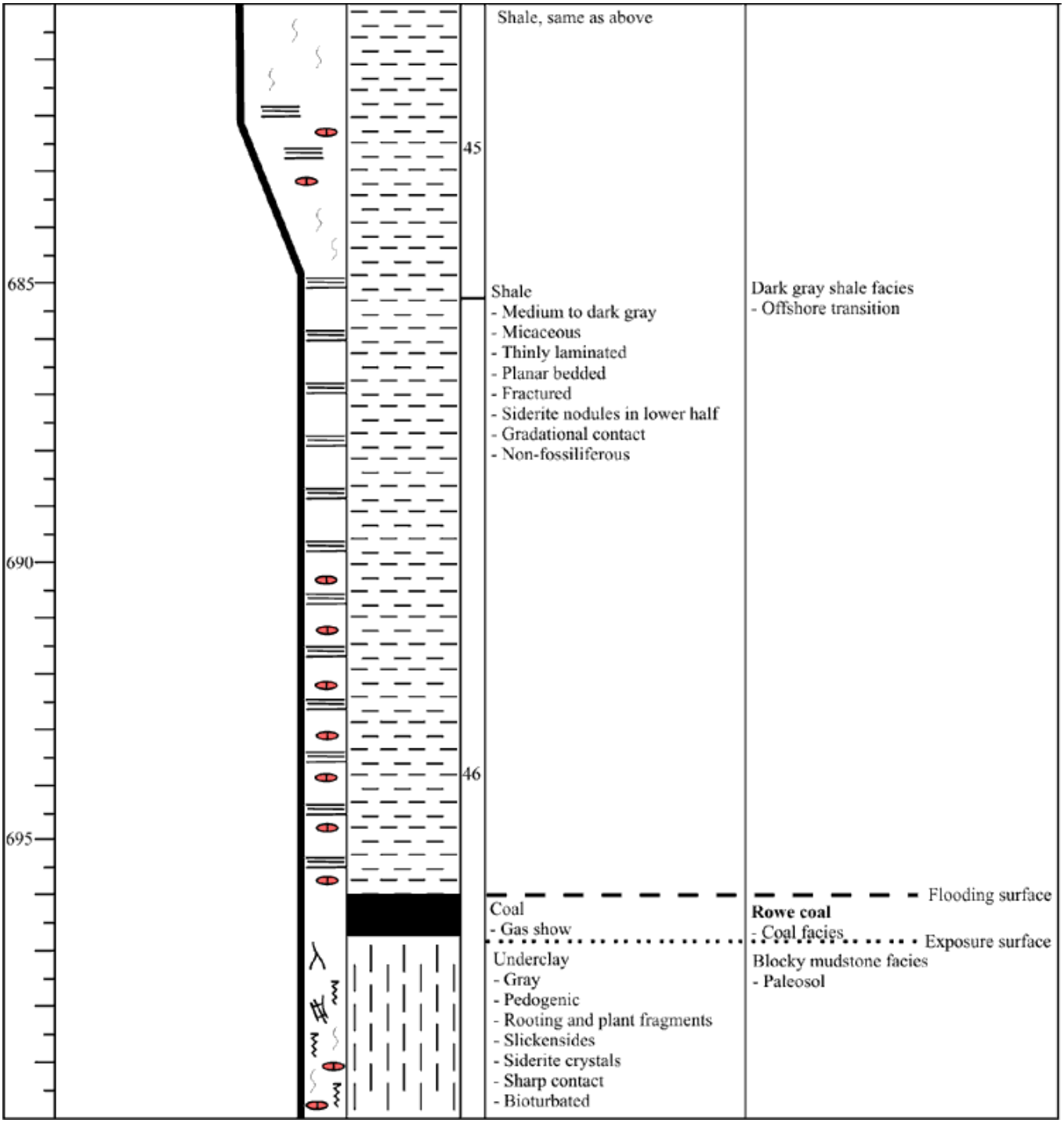

585
590
595
38
39
40
Sandstone
- Light brown
- Siliceous
- Very fine-grained, well sorted and rounded
- Thinly bedded to thickly laminated
- Flaser bedded
- Fractured on top
- Gradational contact
- Bioturbated on bottom
Shale
- Dark gray to black
- Thinly laminated and planar
- Diagonal fracturing
- Phosphatic
- Gradational contact
Underclay
- Gray
- Pedogenic
- Abundant plant fragments and rooting
- Slickensides
- Sharp contact
- Bioturbated
Shale
- Gray
- Micaceous
- Pedogenically altered
- Thinly laminated
- Planar bedded
- Siderite nodules
- Plant fragments
- Gradational contact
- Bioturbated
Sandstone
- Light brown to gray
- Siliceous w/ mica laminae
- Very fine-grained, well sorted and rounded
- Thickly laminated
- Flaser, lenticular and wavy bedded
- Soft sediment deformation
- Siderite, and rip-up clasts
- Gradationalcontact
- Bioturbated
Crevasse Splay
- Unidirectional flow
- Some tidal influence
- Coarsens upward
Flooding surface
Blocky mudstone facies
- Paleosol
Sideritic gray shale facies
- Inner estuarine - central basin
Bartlesville/Bluejacket Sandstone
Interlaminated sandstone and siltstone facies
- Bay head delta, upper estuarine
- Incised valley fill
- Bimodal flow
- Tidal influenced

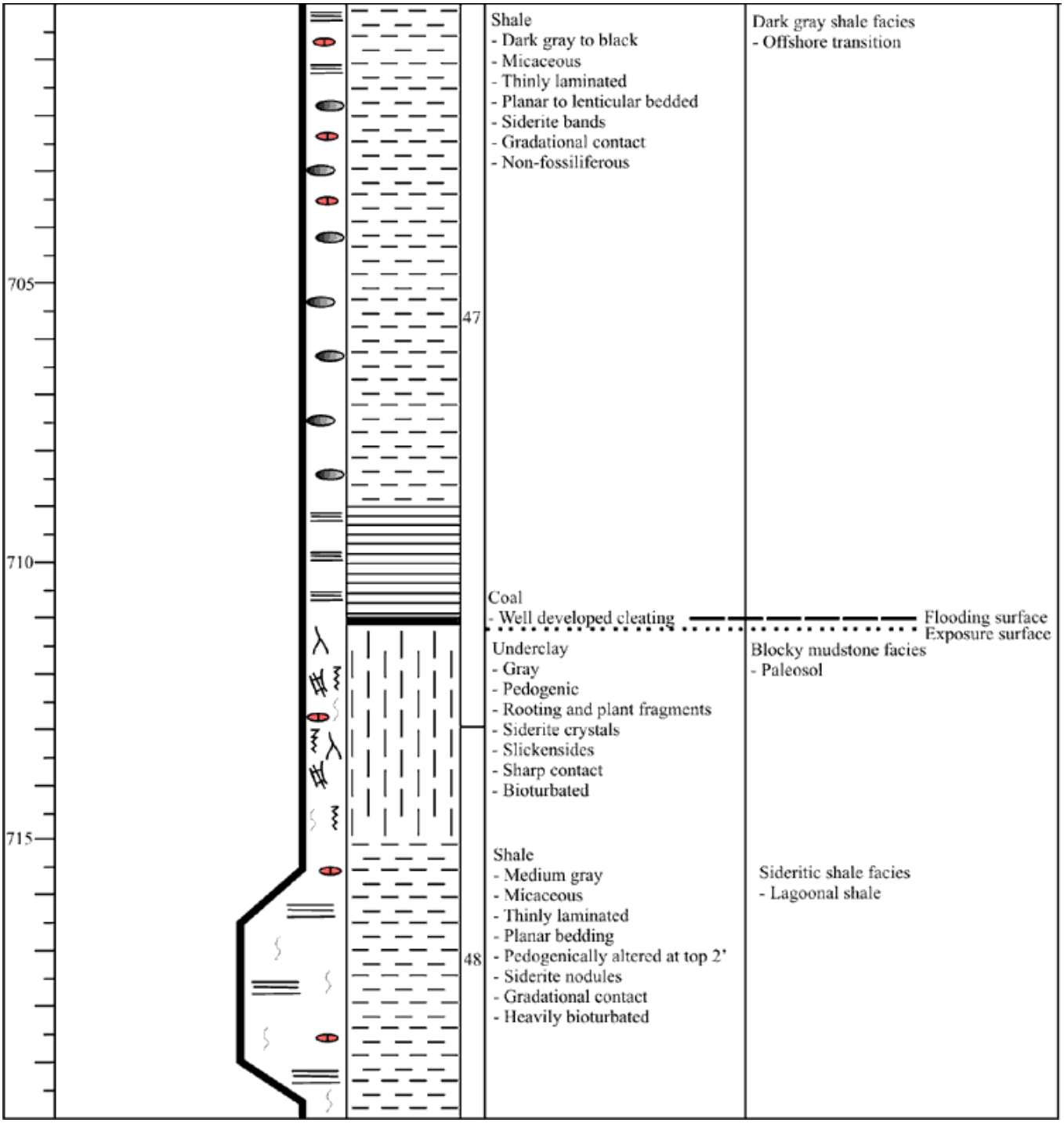

Sandstone, same as above
Interlaminated sandstone and siltstone facies
Escape structures
605
40
Rip-up clasts
Passively filled vertical burrows
610
Rip-up clasts
615
41
Erosional contact
Exposure surface
(sequence boundary)

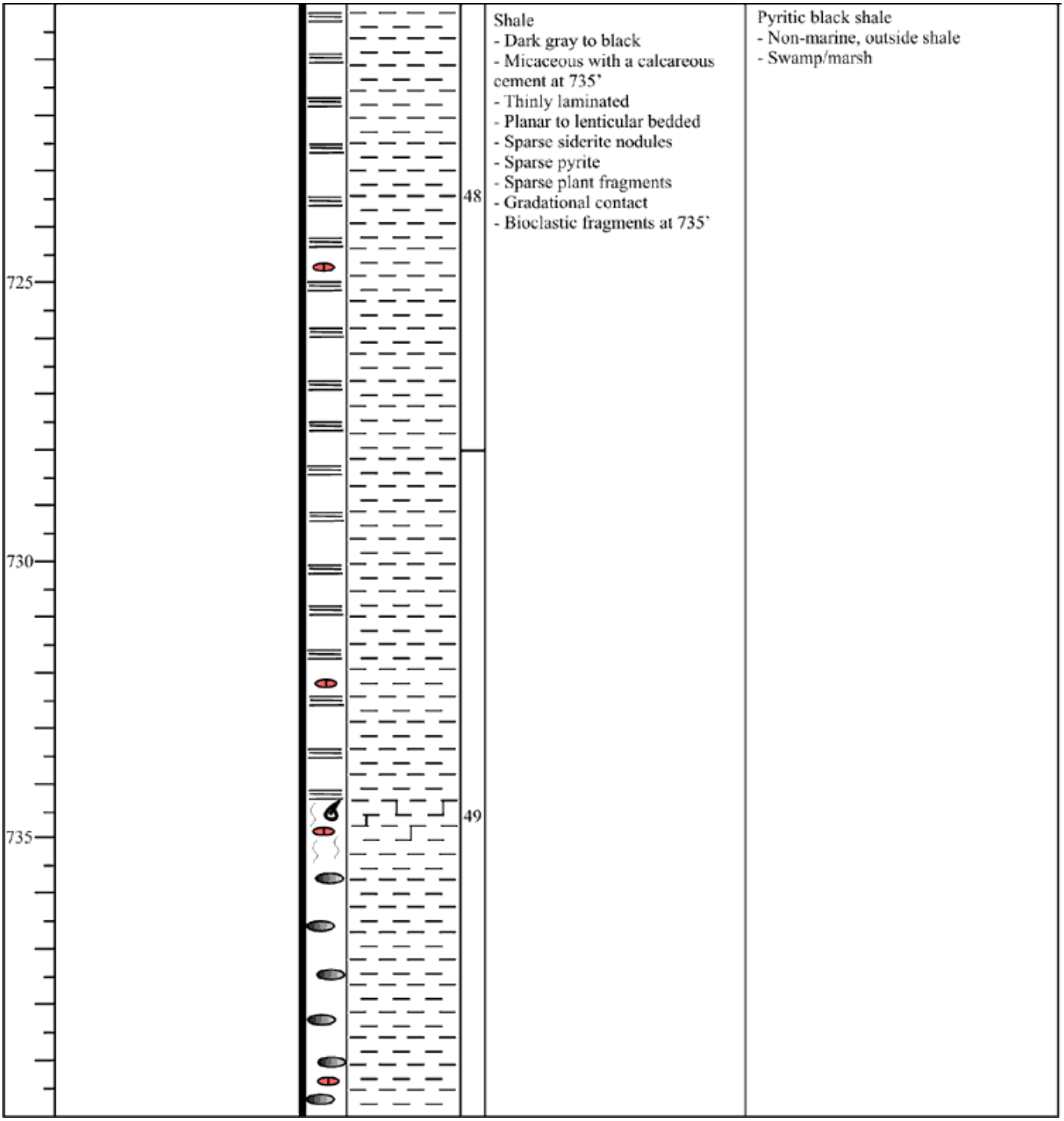

625
630
635
41
42
Shale
- Dark gray, lightens upward
- Micaceous
- Thinly laminated
- Planar bedded
- Rooting?
- Siderite nodules
- Gradational contact
- Some bioturbation
Dark gray shale facies
- Offshore transition
- Shoaling upward
Black shale
- Micaceous
- Thinly laminated
- Planar bedded
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
- Shelf shale
Flooding surface
Coal
- Sharp contact
Drywood coal
- Coal facies
Exposure surface
Underclay
- Medium gray
- Pedogenic
- Rooting
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Blocky mudstone facies
- Similar to an underclay
- Nearshore shale
Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Planar bedded
- Top is pedogenically altered
- Rooting
- Pyrite nodules
- Gradational contact
- Bioturbated
Pyritic black shale
- Swamp/marsh

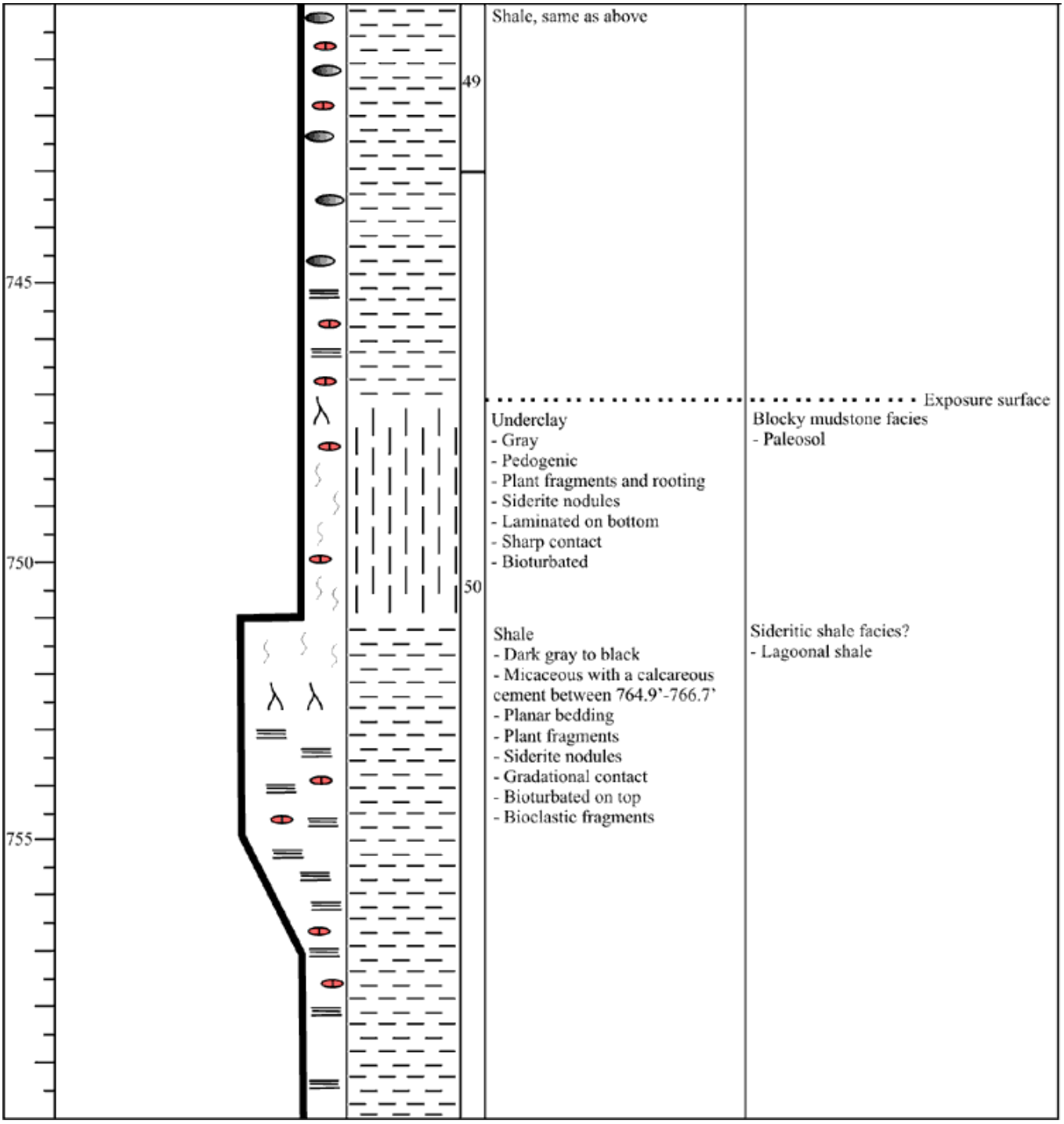

645
650
655
Shale, same as above
Pyritic black shale facies
- Swamp/marsh
Limestone
- Brown
- Calcareous
- Thinly bedded
- Sharp contact
- Bioclastic fragments
Bioclastic packstone facies
Flooding surface
Crevasse splay
- Tidal influenced
Sandstone
- Gray to light brown
- Siliceous w/ micaceous laminae
- Very fine-grained, well sorted, well rounded
- Thickly laminated
- Wavy bedding
- Sharp contact
- Non-fossiliferous
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedded
- Siderite nodules
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
Limestone
- Dark brown
- Calcareous
- Medium bedded
- Bioclasts of brachiopods and bryozoans
- Bioturbated
Bioclastic wackestone facies
- Open marine limestone
- Below wave base
Flooding surface
Carbonaceous shale facies
Exposure surface
Underclay
- Dark gray
- Very fossiliferous and carbonaceous shale, overlying a pedogenic bioturbated soil
Blocky mudstone facies
- Paleosol

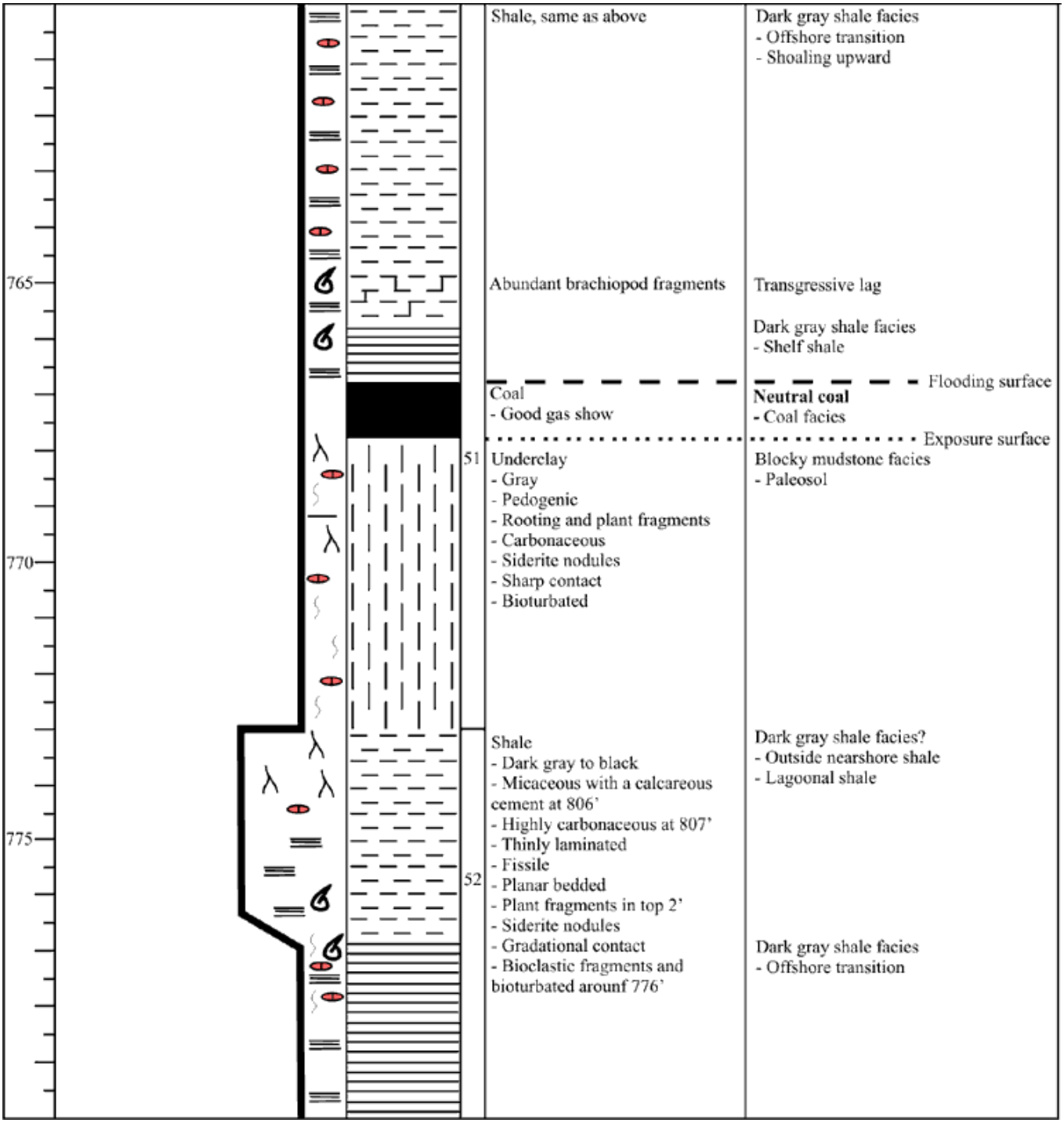

665
670
675
44
45
Shale
- Dark gray
- Micaceous, high carbon content
- Thinly laminated
- Planar bedded
- Rooting and plant fragments
- Siderite nodules
- Gradational contact
- Non-fossiliferous
Nonmarine, outside shale
Carbonaceous shale
- Coaly streaks
- Gas show
Carbonaceous shale facies
Flooding surface
Exposure surface
Underclay
- Gray
- Pedogenic
- Rooting and plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Lenticular to planar bedded
- Siderite nodules
- Gradational contact
- Non-fossiliferous
Crevasse splay
Exposure surface
Underclay
- Gray
- Slickensides
- Siderite crystals
- Sharp contact
- Heavily bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Gray
- Micaceous
- Thinly laminated
- Planar bedded
- Siderite crystals
- Gradational contact
- Heavily bioturbated
Sideritic shale facies
- Lagoonal shale

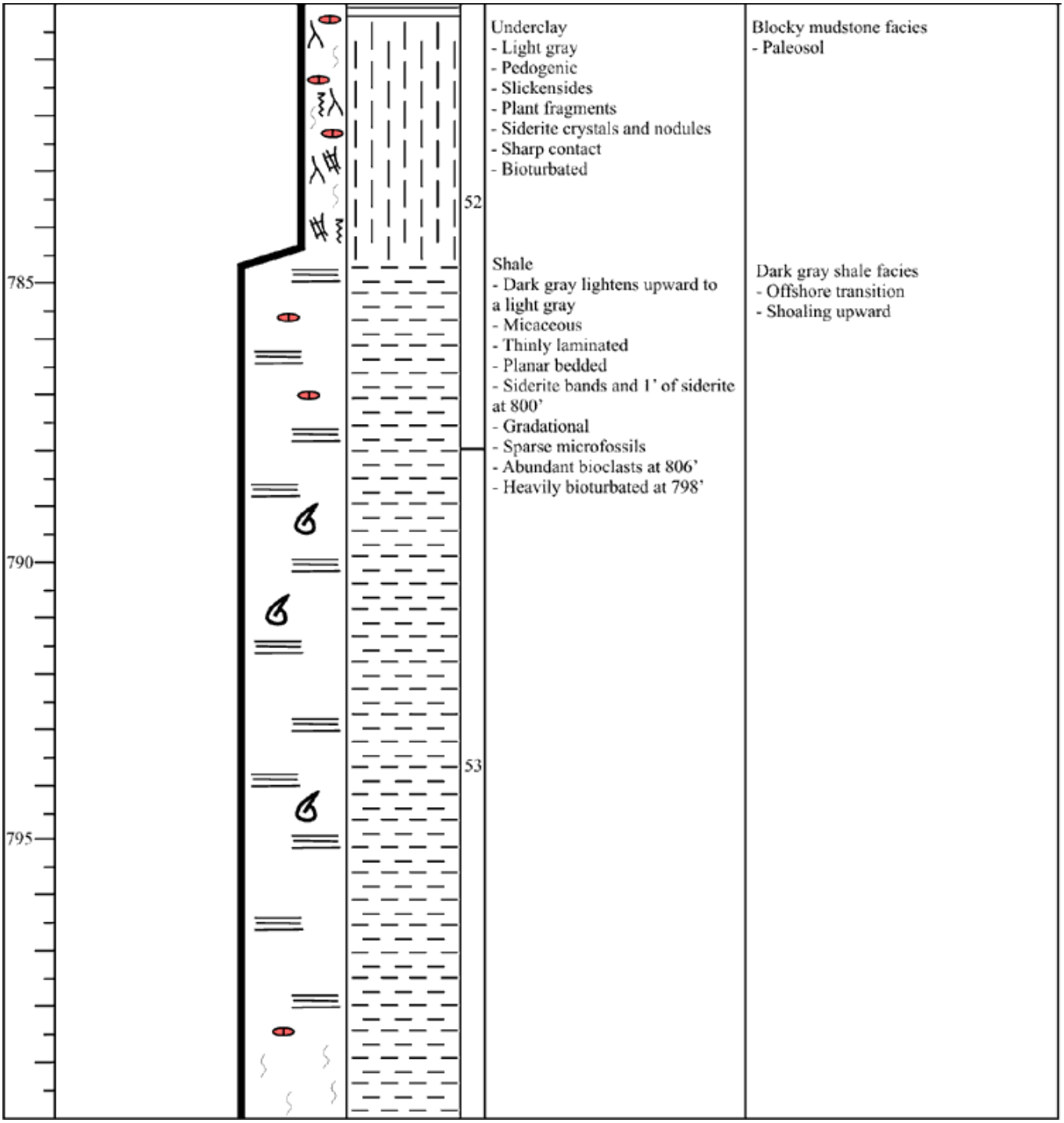

685
690
695
45
46
Shale, same as above
Shale
- Medium to dark gray
- Micaceous
- Thinly laminated
- Planar bedded
- Fractured
- Siderite nodules in lower half
- Gradational contact
- Non-fossiliferous
Coal
- Gas show
Underclay
- Gray
- Pedogenic
- Rooting and plant fragments
- Slickensides
- Siderite crystals
- Sharp contact
- Bioturbated
Dark gray shale facies
- Offshore transition
Flooding surface
Rowe coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol

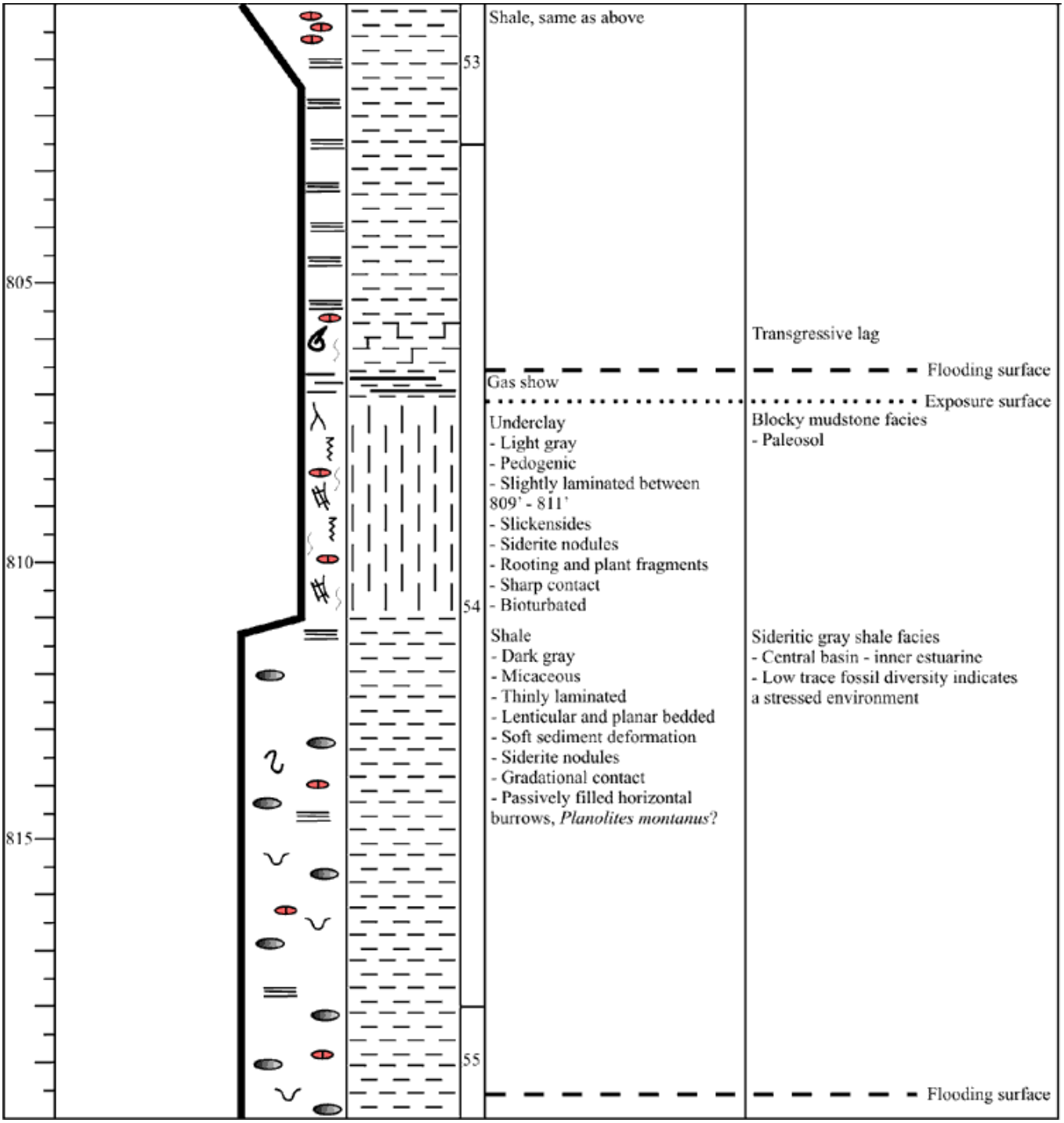

705
710
715
47
48
Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Planar to lenticular bedded
- Siderite bands
- Gradational contact
- Non-fossiliferous
Dark gray shale facies
- Offshore transition
Coal
- Well developed cleating
Flooding surface
Exposure surface
Underclay
- Gray
- Pedogenic
- Rooting and plant fragments
- Siderite crystals
- Slickensides
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Medium gray
- Micaceous
- Thinly laminated
- Planar bedding
- Pedogenically altered at top 2'
- Siderite nodules
- Gradational contact
- Heavily bioturbated
Sideritic shale facies
- Lagoonal shale

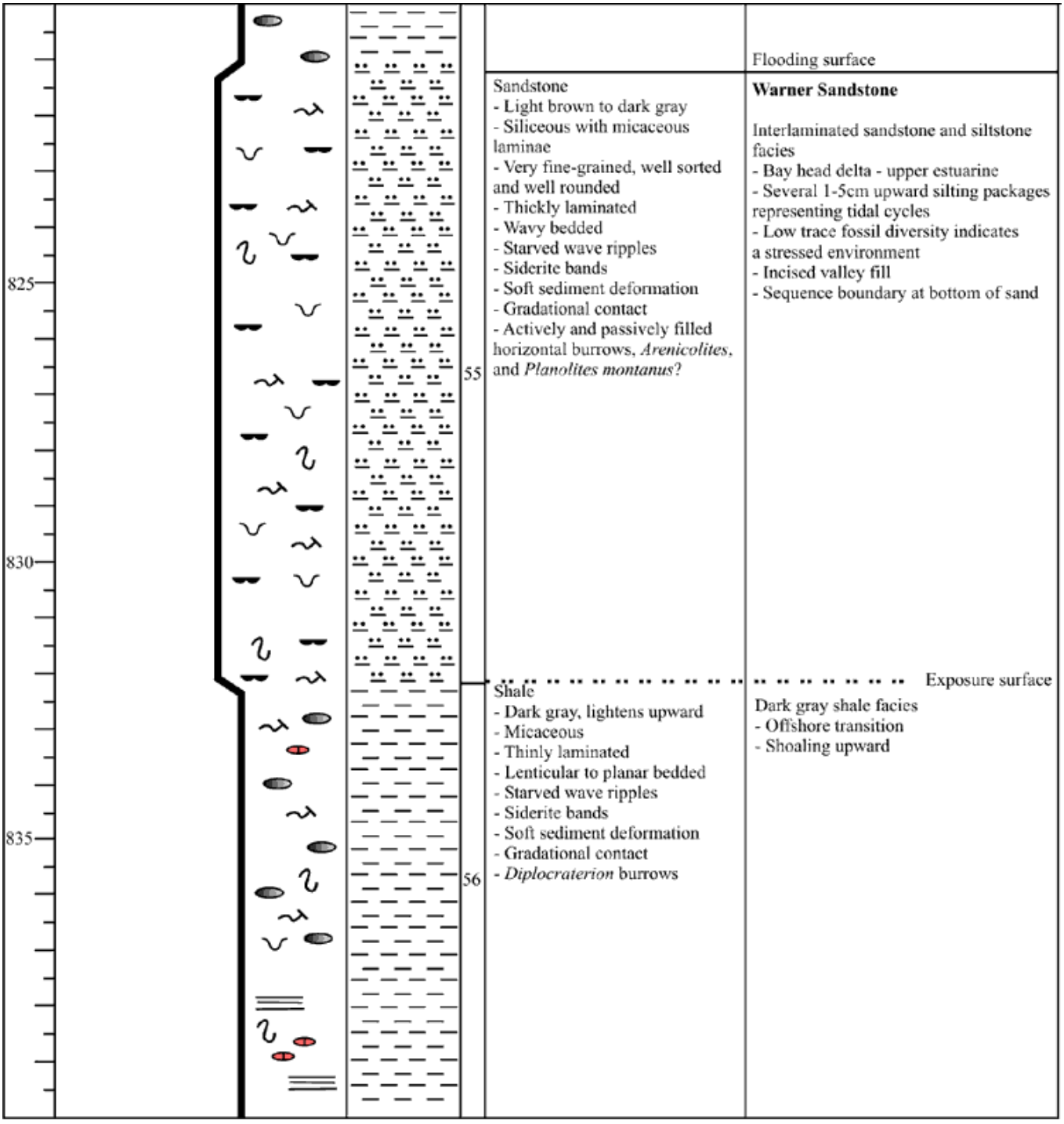

725
730
735
48
49
Shale
- Dark gray to black
- Micaceous with a calcareous cement at 735'
- Thinly laminated
- Planar to lenticular bedded
- Sparse siderite nodules
- Sparse pyrite
- Sparse plant fragments
- Gradational contact
- Bioclastic fragments at 735'
Pyritic black shale
- Non-marine, outside shale
- Swamp/marsh

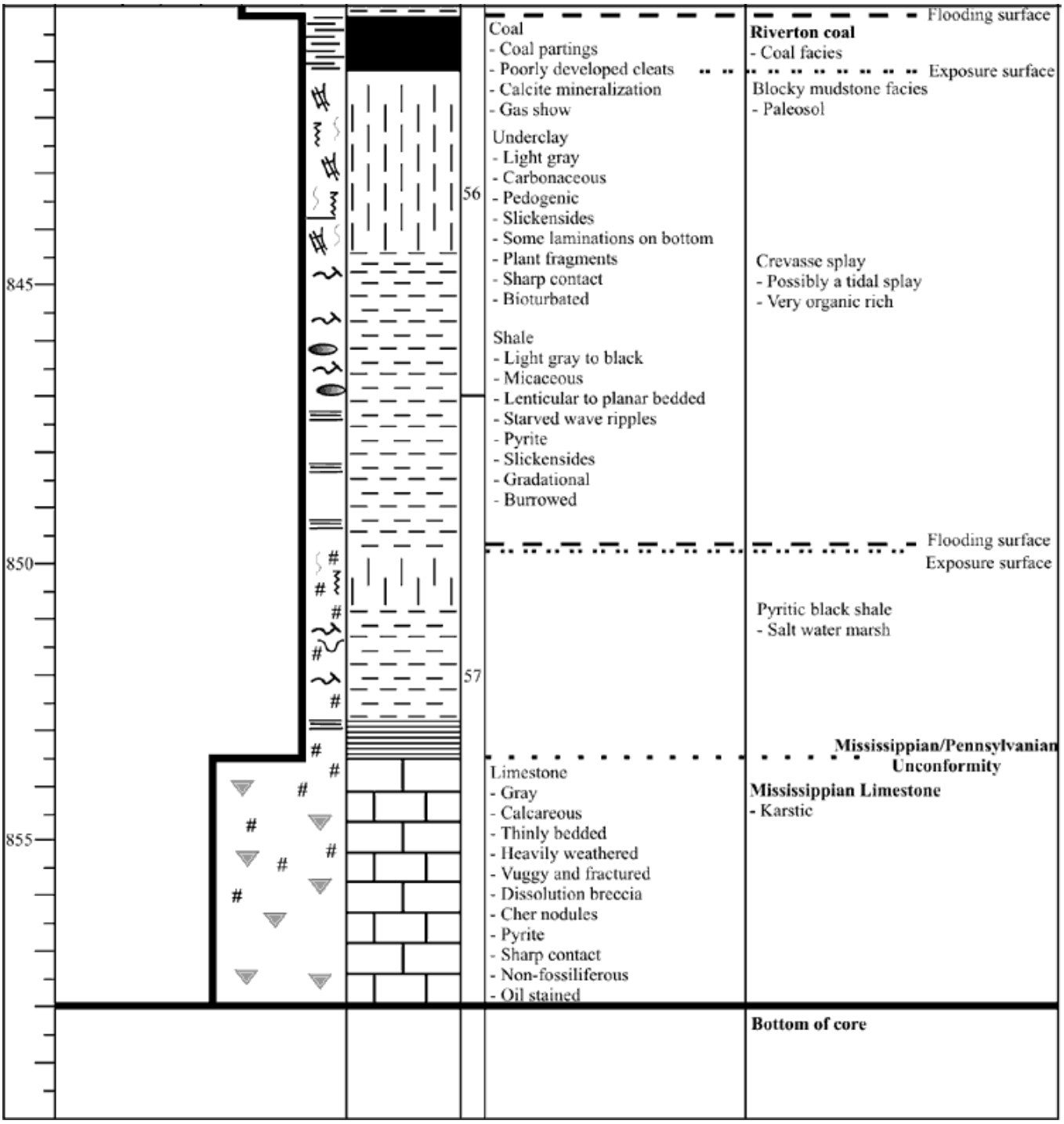

745
750
755
49
50
Shale, same as above
Exposure surface
Underclay
- Gray
- Pedogenic
- Plant fragments and rooting
- Siderite nodules
- Laminated on bottom
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Dark gray to black
- Micaceous with a calcareous cement between 764.9'-766.7'
- Planar bedding
- Plant fragments
- Siderite nodules
- Gradational contact
- Bioturbated on top
- Bioclastic fragments
Sideritic shale facies?
- Lagoonal shale


765
770
775
51
52
Shale, same as above
Dark gray shale facies
- Offshore transition
- Shoaling upward
Abundant brachiopod fragments
Transgressive lag
Dark gray shale facies
- Shelf shale
Flooding surface
Coal
- Good gas show
Neutral coal
- Coal facies
Exposure surface
Underclay
- Gray
- Pedogenic
- Rooting and plant fragments
- Carbonaceous
- Siderite nodules
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Dark gray to black
- Micaceous with a calcareous cement at 806'
- Highly carbonaceous at 807'
- Thinly laminated
- Fissile
- Planar bedded
- Plant fragments in top 2'
- Siderite nodules
- Gradational contact
- Bioclastic fragments and bioturbated arounf 776'
Dark gray shale facies?
- Outside nearshore shale
- Lagoonal shale
Dark gray shale facies
- Offshore transition


785
790
795
52
53
Underclay
- Light gray
- Pedogenic
- Slickensides
- Plant fragments
- Siderite crystals and nodules
- Sharp contact
- Bioturbated
Shale
- Dark gray lightens upward to a light gray
- Micaceous
- Thinly laminated
- Planar bedded
- Siderite bands and 1' of siderite at 800'
- Gradational
- Sparse microfossils
- Abundant bioclasts at 806'
- Heavily bioturbated at 798'
Blocky mudstone facies
- Paleosol
Dark gray shale facies
- Offshore transition
- Shoaling upward

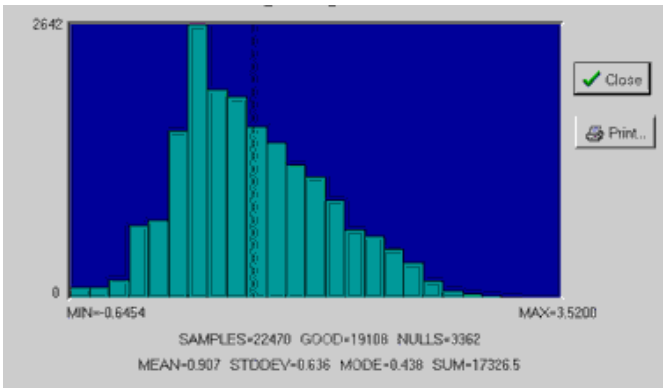

805
810
815
53
54
55
Shale, same as above
Transgressive lag
Flooding surface
Gas show
Exposure surface
Underclay
- Light gray
- Pedogenic
- Slightly laminated between 809' - 811'
- Slickensides
- Siderite nodules
- Rooting and plant fragments
- Sharp contact
- Bioturbated
Blocky mudstone facies
- Paleosol
Shale
- Dark gray
- Micaceous
- Thinly laminated
- Lenticular and planar bedded
- Soft sediment deformation
- Siderite nodules
- Gradational contact
- Passively filled horizontal burrows, *Planolites montanus*?
Sideritic gray shale facies
- Central basin - inner estuarine
- Low trace fossil diversity indicates a stressed environment
Flooding surface


825
830
835
55
56
Flooding surface
Sandstone
- Light brown to dark gray
- Siliceous with micaceous laminae
- Very fine-grained, well sorted and well rounded
- Thickly laminated
- Wavy bedded
- Starved wave ripples
- Siderite bands
- Soft sediment deformation
- Gradational contact
- Actively and passively filled horizontal burrows, *Arenicolites*, and *Planolites montanus*?
Warner Sandstone
Interlaminated sandstone and siltstone facies
- Bay head delta - upper estuarine
- Several 1-5cm upward silting packages representing tidal cycles
- Low trace fossil diversity indicates a stressed environment
- Incised valley fill
- Sequence boundary at bottom of sand
Exposure surface
Shale
- Dark gray, lightens upward
- Micaceous
- Thinly laminated
- Lenticular to planar bedded
- Starved wave ripples
- Siderite bands
- Soft sediment deformation
- Gradational contact
- *Diplocraterion* burrows
Dark gray shale facies
- Offshore transition
- Shoaling upward

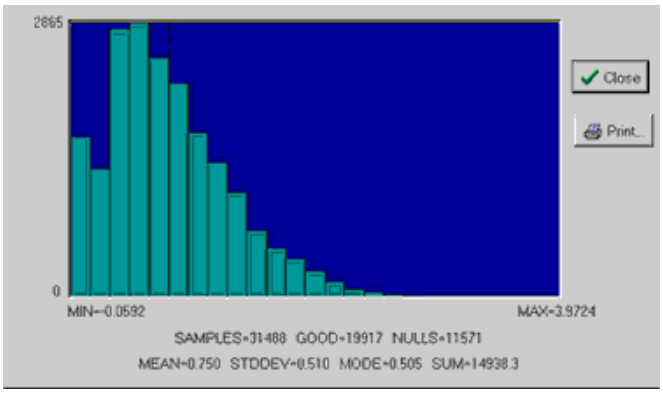

845
850
855
56
57
Coal
- Coal partings
- Poorly developed cleats
- Calcite mineralization
- Gas show
Underclay
- Light gray
- Carbonaceous
- Pedogenic
- Slickensides
- Some laminations on bottom
- Plant fragments
- Sharp contact
- Bioturbated
Shale
- Light gray to black
- Micaceous
- Lenticular to planar bedded
- Starved wave ripples
- Pyrite
- Slickensides
- Gradational
- Burrowed
Limestone
- Gray
- Calcareous
- Thinly bedded
- Heavily weathered
- Vuggy and fractured
- Dissolution breccia
- Cher nodules
- Pyrite
- Sharp contact
- Non-fossiliferous
- Oil stained
Flooding surface
Riverton coal
- Coal facies
Exposure surface
Blocky mudstone facies
- Paleosol
Crevasse splay
- Possibly a tidal splay
- Very organic rich
Flooding surface
Exposure surface
Pyritic black shale
- Salt water marsh
Mississippian/Pennsylvanian Unconformity
Mississippian Limestone
- Karstic
Bottom of core

Appendix 2: Statistical distribution of coal thickness

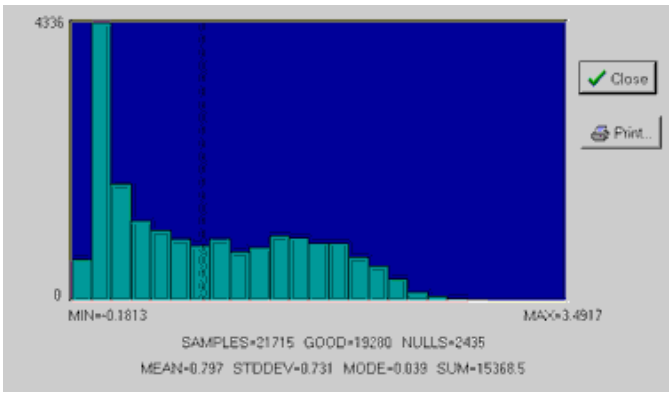
Summit coal



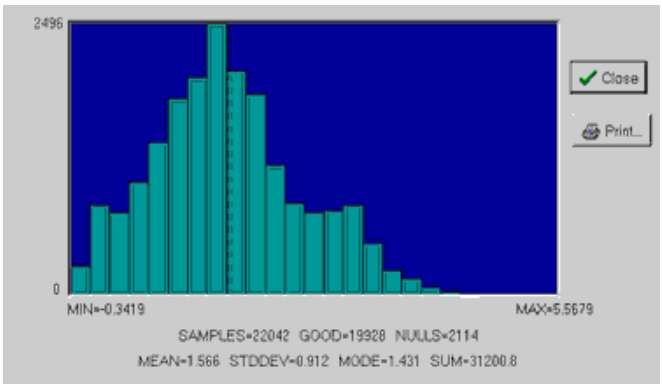
Mulky coal



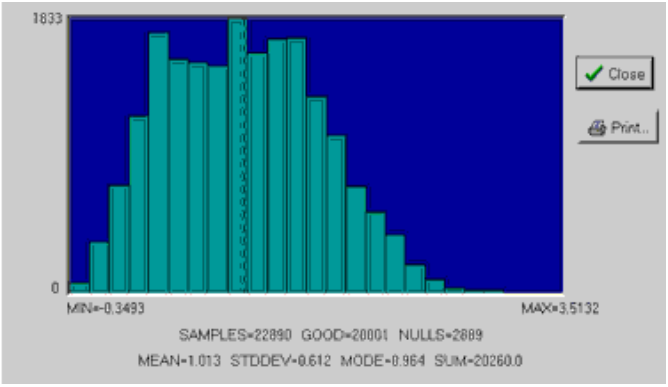
Iron Post coal



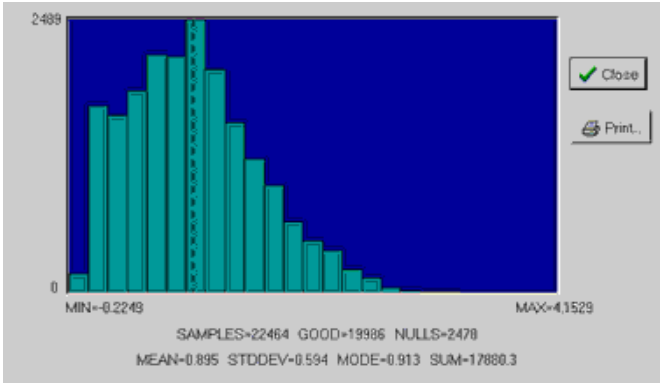
Bevier coal



Croweburg coal

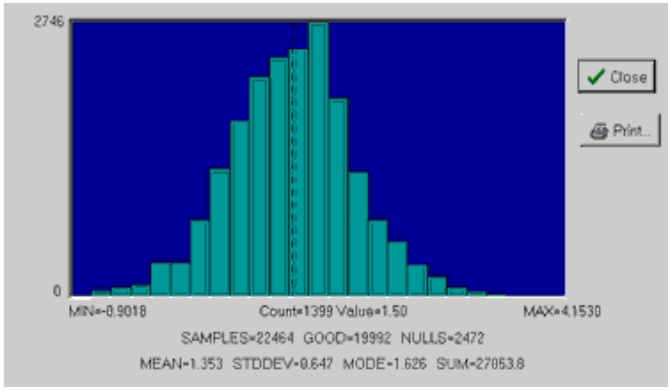


Fleming coal

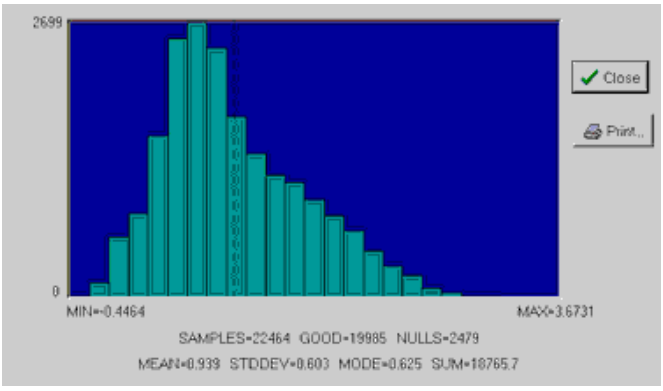


Mineral coal

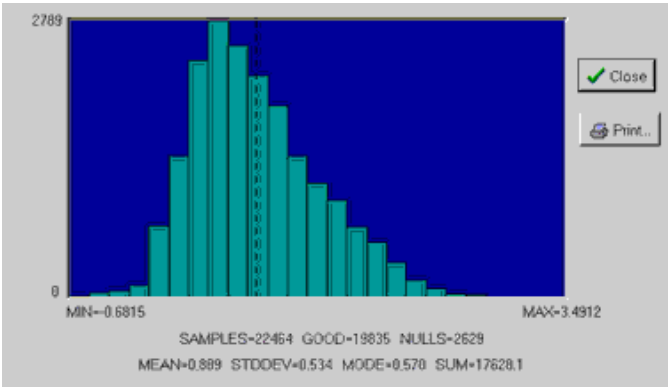
Scammon coal



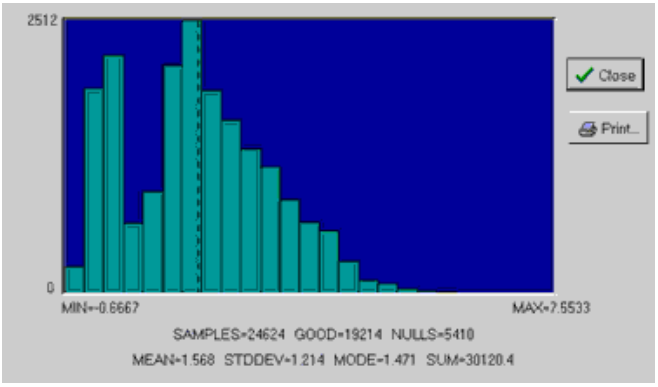
Tebo coal



Weir-Pittsburg coal



Aw coal



Riverton coal