THE SEQUENCE STRATIGRAPHY OF THE WOODBINE AND EAGLE FORD GROUPS IN THE EAST TEXAS BASIN (USA): A NEW CHRONOSTRATIGRAPHIC FRAMEWORK TO PROPERLY IDENTIFY AND MAP THEIR ASSOCIATED PLAYS AND PLAY FAIRWAYS

A Thesis

by

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ABSTRACT

The Woodbine and Eagle Ford Groups are prolific hydrocarbon-bearing reservoirs in the East Texas Basin (ETB). However, complex stratigraphic relationships between these units in the subsurface has led to the succession simply being referred to as the "Eaglebine." Along the outcrop belt, the organic-rich mudstones at the base of the Eagle Ford Group unconformably overlie Early Cenomanian argillaceous mudstones and sandstones of the Woodbine Group. In sharp contrast, within the southern ETB, Late Cenomanian sandstones, as well as the underlying Middle Cenomanian organic-rich mudstones, are typically included within the Woodbine Group. To resolve the stratigraphic inconsistencies between the outcrop belt and the subsurface, a surface-based, sequence-stratigraphic approach was applied to a grid of well log cross sections, as well as research cores, which tie to the outcrop belt to the west and extend into the sub-subsurface to the east. This study indicates that the unconformity-bounded Woodbine and Eagle Ford Groups, as defined in the outcrops, can be successfully correlated into the subsurface. Within this sequence stratigraphic framework, the Upper Member of the Lower Eagle Ford Formation, as defined in this study, contains Late Cenomanian (Harris Delta) sandstone beds, previously mis assigned to the Early Cenomanian Woodbine Group. With this new sequence stratigraphic framework in place, detailed chrono-stratigraphically defined paleogeographic maps were constructed. These stratigraphic maps reveal for the first time the various conventional and

unconventional plays, as well as the associated play fairways of the Woodbine and Eagle Ford Groups.

DEDICATION

To Cassi and Fitz

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CONTRIBUTORS AND FUNDING SOURCES

Contributors

This research was supervised by a thesis committee consisting of Michael Pope [advisor], and Arthur Donovan [co-advisor] of the Department of Geology and Geophysics, and Stacey Lyle [committee member] of the Department of Geography.

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INTRODUCTION

The Cretaceous is one of the most intriguing periods of Earth's history. It's a time of significant global change in the oceans, atmosphere, biosphere, and rock record (Hay et al., 1993; Pratt et al., 1993). High eustatic sea levels inundated the continents, creating a widespread western interior seaway in North America that spread from the Gulf of Mexico to the Arctic Ocean (Figure 1, Modified from Blakey, 2013). Two global ocean anoxia events (OAEs) are recorded in the Cretaceous rock record, one of which, the Cenomanian-Turonian OAE-2, is an important marker in the East Texas Basin (Figure 2). Texas during the Cretaceous was the southernmost extent of the Cretaceous Western Interior Seaway and at a complicated geologic crossroads between tectonic forces, and siliciclastic and carbonate deposition. Through the Cretaceous and into the Cenozoic, clastic and carbonate sediment continued to fill the basin, extending the shorelines to its present-day configuration. This study (Figure 3) focused on the Cenomanian and Turonian strata of the East Texas Basin (ETB). Due to changes in absolute and relative ages between the different versions of the geologic timescale, the 2012 ICS geologic time scale was used as the standard for this study (Gradstein et al., 2012).

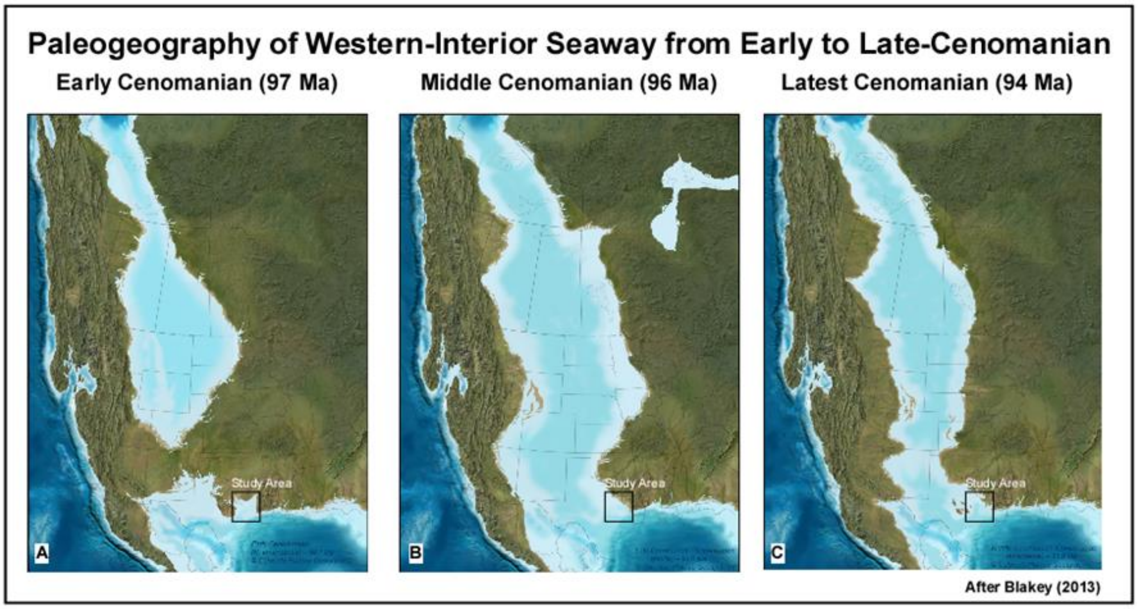

Figure 1. Paleogeography map of the Cretaceous Western Interior Seaway from the Early to Latest Cenomanian. Modified from Blakey (2013).

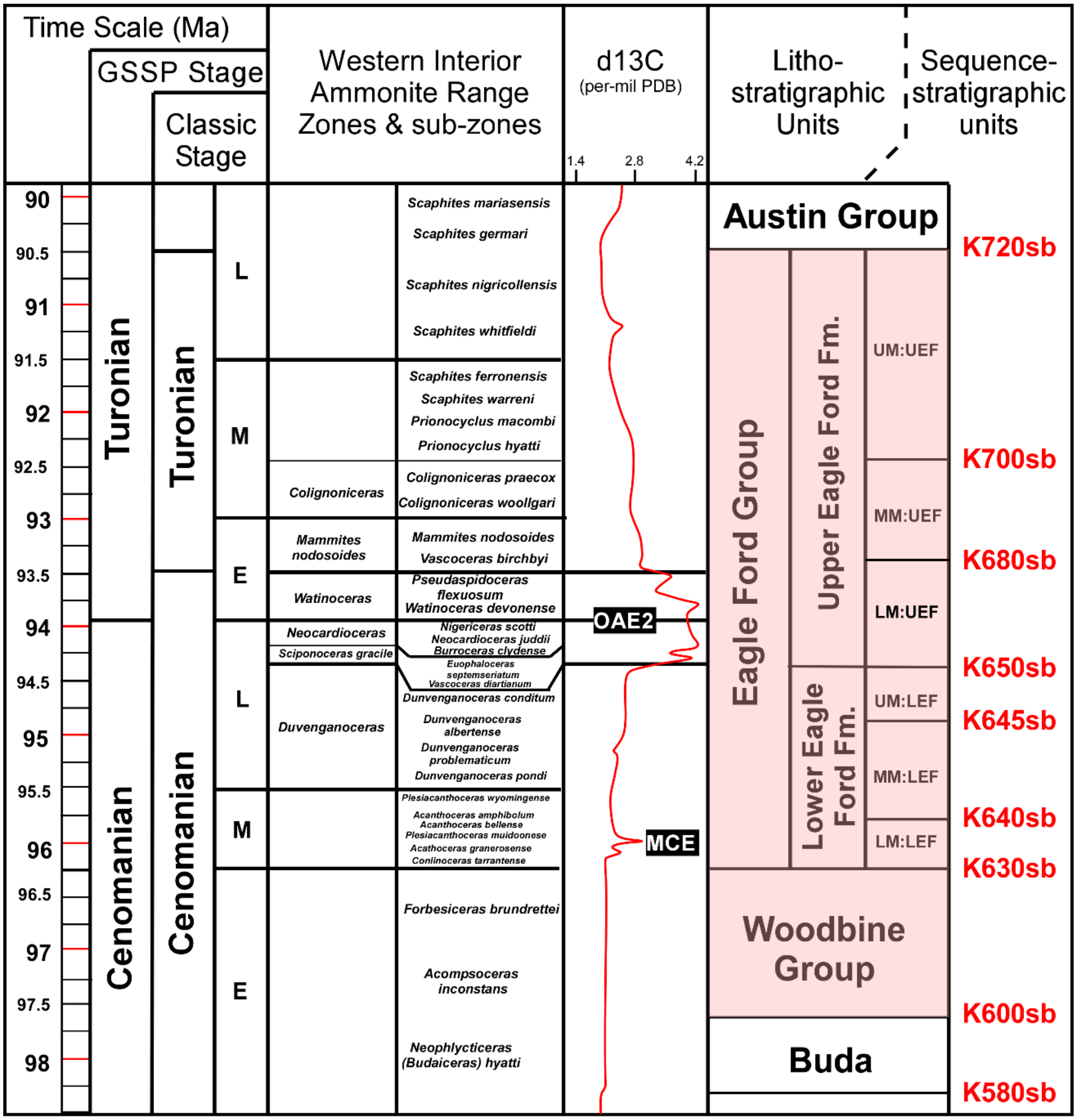

Figure 2. Classic and New ICS Stages, macrofaunal zones, mega-cycles, and δ13C global isotope profile for the Middle Cretaceous based on the work of Ogg and Hinnov (2012), tied to the chronostratigraphy of the East Texas Basin (ETB) as defined in this study. Interval of study highlighted in pink.

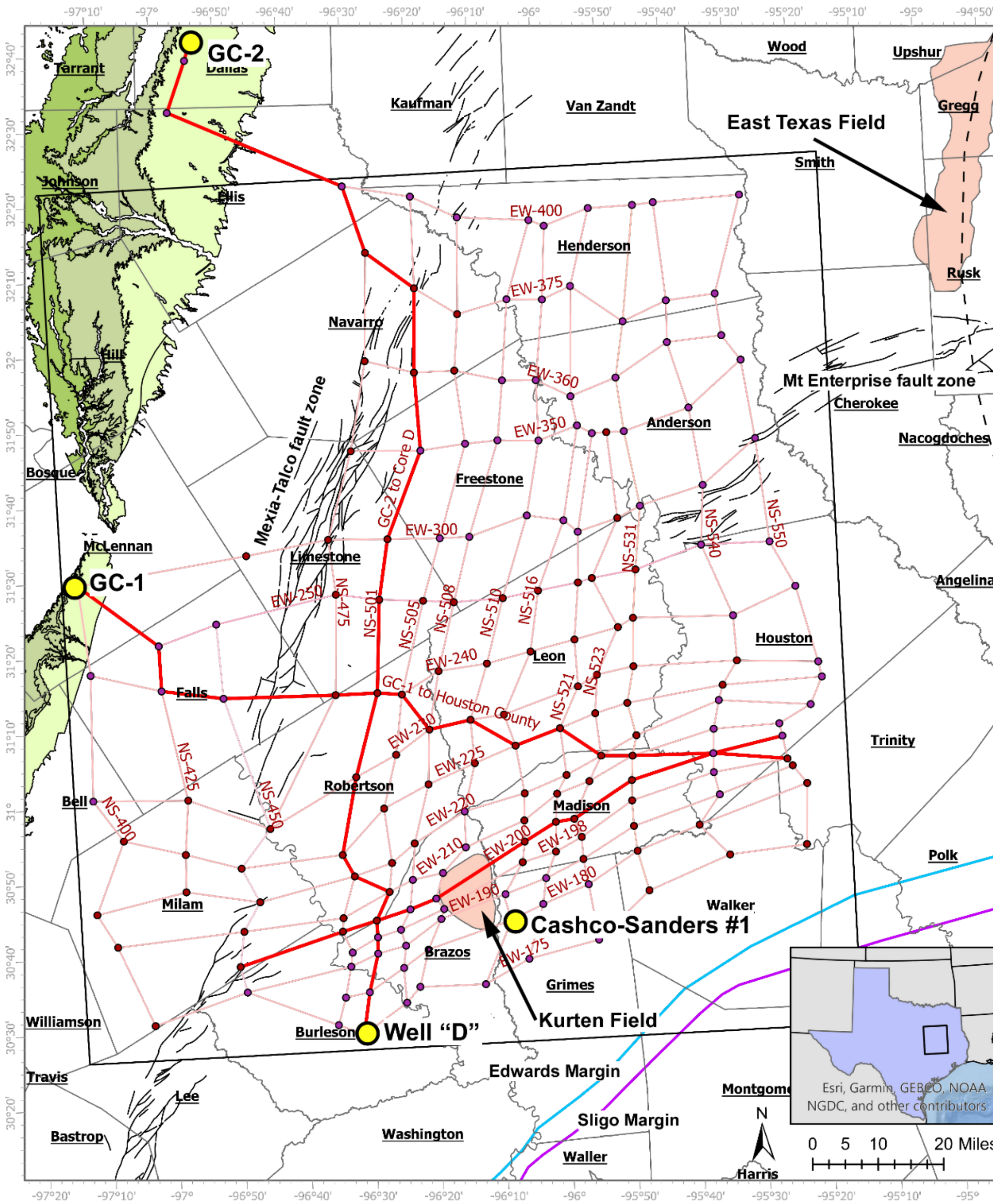

Figure 3. Base map of the East Texas Basin (ETB) showing the major structural and stratigraphic features, along with the approximate study area outlined in black. Bold red lines represent figures 7-9. The ETB is bounded to the west by the Upper Cretaceous outcrop belt, to the east by the Sabine Uplift, and to the south by the Lower Cretaceous Edwards, and Sligo shelf margins. The wells located with yellow circles are the four type wells used in this study.

In the subsurface of the southern ETB, Middle Cretaceous strata of the respective Woodbine, Eagle Ford, and Austin Groups (Figure 2) often form a classic reservoir, source, and seal petroleum system (Halbouty, 1991). Historically, most production came from conventional fluvial/deltaic reservoirs within the Woodbine Group, such as at the prolific East Texas Oil Field (Halbouty, 1991). Recently, however, production in the ETB has transitioned to unconventional source- and tight-rock reservoirs within the Eagle Ford Group in south Texas, as well as the ETB (Hentz et al., 2014; Donovan et al., 2017, 2019). A recent USGS assessment estimated the undiscovered, technically recoverable, mean resources in the Eagle Ford Group and associated Cenomanian-Turonian strata in Gulf Coast Region of Texas at 8.5 BBL of oil, 66 TCF of natural gas, and 1.9 BB of natural gas liquids (Whidden et al., 2018). Based on these estimates, it's clear that a thorough understanding of various Eagle Ford unconventional source rock, as well as tight rock plays and their associated risks, could be the critical difference between successful exploitation, or billion-dollar write-offs (Sider and Fowler, 2013).

Despite the significant exploitation of the East Texas Basin since the early 1900's, ambiguities still exist surrounding the relationship between the Eagle Ford and Woodbine Groups, especially the differences between the outcrop and subsurface stratigraphy. Along the outcrop belt (Figure 3), Middle Cenomanian to Late Turonian Eagle Ford strata unconformably overlie Early Cenomanian Woodbine strata (Adkins et al., 1932; Adkins and Lozo, 1951). In sharp contrast within the southern ETB, Late Cenomanian sandstones as well as underlying Middle Cenomanian organic-rich mudstones, are typically included within the Woodbine Group (Hentz et al., 2014). One of the major subsurface challenges is the age and stratigraphic assignment of the Harris Delta, which was first identified as a younger (Late Cenomanian) delta system, which overlies an older Woodbine (Freestone) Delta in the southern ETB (Oliver, 1971). While Oliver (1971) recognized that the Harris Delta system was equivalent to the Middle Cenomanian to Turonian Eagle Ford mudstones, he unfortunately litho-stratigraphically assigned these sand-prone strata to the Woodbine Group. A similar approach was taken by Turner and Conger (1984), who interpreted the reservoir sands in Kurten Field (Brazos County) as being the distal fringes of the Harris Delta, and included these sands and the underlying, organic-rich, high-resistivity mudstones to the Woodbine Group (Turner and Conger, 1984). Subsequent papers by Berg and Leethem (1985), and more recently by Hentz et al. (2014) reinforced this lithostratigraphic approach. These papers also assigned the Late Cenomanian Harris Delta sands and underlying Middle Cenomanian organic-rich strata, as part of the Woodbine Group. Within this context these Woodbine strata became equivalent to the Lower Eagle Ford Formation of South Texas (Hentz et al., 2014).

Thus, the resulting lithostratigraphic (facies) designation of Woodbine and Eagle Ford Groups in the subsurface of the southern ETB is in sharp contrast to the outcrop stratigraphic relationships established by Adkins (1932), and subsequently followed by other researchers (Adkins and Lozo, 1951; Brown and Pierce, 1962; Donovan et al., 2015), where the Middle Cenomanian to Late Turonian Eagle Ford Group unconformably overlies the Early Cenomanian Woodbine Group.

This study is a fresh way to reconcile the differences between the surface and sub-subsurface stratigraphy of the Woodbine and Eagle Ford Groups in the East Texas Basin by taking the surface (sequence) -based framework established in the outcrop belt and extending it into the subsurface using a grid of well log cross sections and shallow boreholes (Figure 3). With this sequence stratigraphic framework in place, chronostratigraphic-based paleogeographic maps were constructed in the subsurface, allowing definition of its conventional and unconventional plays and play fairways.

GEOLOGY OF THE EAST TEXAS BASIN

Regional Tectonic Setting

The East Texas Basin (ETB) was one of the many Mesozoic sedimentary basins (Figure 3) that developed along the southern margin of the North American craton during the Triassic opening of the Gulf of Mexico (Jackson and Seni, 1983; Davidoff, 1993). The Jurassic Louann Salt was deposited unconformably on Paleozoic basement rocks and Triassic rift-valley fill in the East Texas Basin. Approximately 1500 m of salt was deposited in the rift valley (Jackson and Seni, 1983). Subsequently, salt diapirism was produced by loading from 1) deposition of a Lower Cretaceous carbonate wedge, 2) progradation of thick Upper Cretaceous siliciclastic units, and 3) uplift, erosion, and tilting of the basin (Jackson and Seni, 1983). However, unlike the Cenozoic succession in the offshore Gulf of Mexico where fields typically are secondary diapir-related sub-salt structures, in the ETB, many fields are simple salt-cored anticlinal traps (Jackson and Seni, 1983). Furthermore, key basement features, such as the San Marcos Arch and Sabine Uplift, were intermittently active into the Late Cretaceous (Jackson and Seni, 1983). This Laramide compression deformation, and associated uplift and erosion, played a major role in setting up many of the traps in the East Texas Basin, like the super-giant East Texas Field (Jackson and Seni, 1983).

Cretaceous Stratigraphic Overview

This study follows the 2012 ICS Time Scale (Gradstein et al., 2012) in reference to age assignments. The Middle Cretaceous (Cenomanian/Turonian/Coniacian) stratigraphic succession in the ETB is outlined on Figure 2. Within the ETB, Early Cenomanian strata of the Grayson (Del Rio) and Buda Formations are overlain sequentially by the unconformity-bounded Woodbine, Eagle Ford, and Austin Groups (Adkins et al., 1932). These Middle Cretaceous units are exposed along the western and northern margins of the basin and were studied in classic publications by Adkins and Lozo (1951); Dodge (1952) and Mancini (1974, 1977, 1979).

Along the outcrop belt, Middle-Cenomanian to Late-Turonian Eagle Ford strata unconformably overlie Early Cenomanian Woodbine strata (Figure 2). The Eagle Ford Group is unconformably overlain by the Latest-Turonian to Early-Campanian Austin Group (Figure 2). The Woodbine Group is sub-divided into three parts: The lower Pepper Formation (mudstone-prone), the middle Dexter Formation (sandstone-prone), and upper Lewisville Formation (mudstone-prone) (Adkins et al., 1932).

Historically, the Eagle Ford Group provincial formation names were commonly used along the outcrop belt. In the Waco area, the (lower) Lake Waco and (upper) South Bosque Formation terms were used (Adkins and Lozo, 1951; Brown and Pierce, 1962). For the Dallas area, the (lower) Tarrant, (middle) Britton, and (upper) Arcadia Park Formation names were used (Adkins and Lozo, 1951; Brown and Pierce, 1962). More recently, Hentz and others (2014), as well as Donovan et. al (2015, 2019), have extended the Eagle Ford stratigraphic terms of South Texas (Lower and Upper Eagle Ford Formations), into the subsurface and outcrops of the East Texas Basin.

METHODS AND DATABASE

Study Area and Data

The location of the study area (Figure 3) is the southern portions of the ETB. Note that the ETB as defined in this study also includes the Brazos sub-basin as defined by Davidoff (1993). This project analyzed the Woodbine and Eagle Ford Groups in 191 well logs and three cores. Well log data primarily were from MJ Logs. Other sources include publicly available wireline well logs from the Texas Railroad Commission, Texas Water Development Board, and historical publications. The 30 resulting well log cross sections (Figure 3) were correlated in Neurasection and drafted in Canvas X.

X-ray Fluorescence (XRF) and X-ray Diffraction (XRD) data were obtained from three cores (Figure 3), the USGS GC-1 (McLennan County, 31.495005, -97.223056), USGS GC-2 (Dallas County, 32.691300, -96.892000), and an industry core (Well D) from Burleson County, that is discussed in detail by Meyer et al. (in press). Stable isotope $\delta^{13}C$ and $\delta^{18}O$ data for these cores was processed by the Stable Isotope Lab at Texas A&M University.

Correlation Methods

An important aspect of this study was correlating key sequence stratigraphic surfaces such as sequence boundaries (sb) and maximum flooding surfaces (mfs), to define a chronostratigraphic framework of the Woodbine and Eagle Ford Groups in the ETB. As illustrated on Figures 2 and 4, this paper follows a surface-based nomenclature outlined by Donovan et al. (2015) and Donovan (2016). In this study, stratigraphic surfaces in the Cretaceous are defined by the letter K, followed by numbers (1 to 999) that define older to younger surfaces respectively. Within this framework, the base of the Woodbine Group was designated as the K600sb; the base of Eagle Ford Group, the K630sb, and the base of the Austin as the K720sb. Thus, the Woodbine Group, as defined in this study, is bounded by the K600sb at its base and the K630sb at its top. Likewise, the Eagle Ford Group, as defined in this study, is bounded by the K630sb at its base and the K720sb at its top.

During this study, numerous stratigraphic datums were used in correlating the well log cross sections. This was facilitated by using a digital platform (Neurasection) for the correlations. However, for this paper, the well log cross sections (Figures 8 & 10), which document this study, are datumed on the base of the Woodbine Group (K600sb). While this datum removes any relict basin physiography, it provided the best visual insights into the stratigraphic relationship between the Woodbine and Eagle Ford Groups, especially the onlapping nature of the Lower Eagle Ford Formation onto the relict topography of the Woodbine Group (K630sb). This datum also removes the significant Late-Turonian deformation that occurs at the base of the Austin Group, which is a commonly used datum in many previous studies (Oliver, 1971; Hentz et al., 2014).

Key Outcrop/Borehole/Reference Wells

This study utilizes three key wells: the USGS GC-1, USGS GC-2, and Well D, an industry well that was cored and previously studied by Meyer (2018). The GC-1 is located at (31.495005, -97.223056) near Waco, Texas. The GC-1 shows a succession from the Georgetown through the Austin Chalk (Figure 4. Modified from Donovan, 2019). The GC-2 is located at (32.691300, -96.892000) near Dallas, Texas, and captures the Upper Woodbine through the Lower Austin (Figure 5. Modified from Meyer, 2018.) However, the geophysical logs for this well only cover the Lower Austin and most of the Eagle Ford. The basal Eagle Ford and uppermost Woodbine were not logged (Figure 5). Well D, located in Burleson County, was cored through the Lower Eagle Ford Formation (LEF) to the top of the Buda (Figure 6). With these three wells as the main tie points, and their associated biostratigraphy, chemostratigraphy, and isotopes data, the grid of cross sections was extended into and across the subsurface in the ETB.

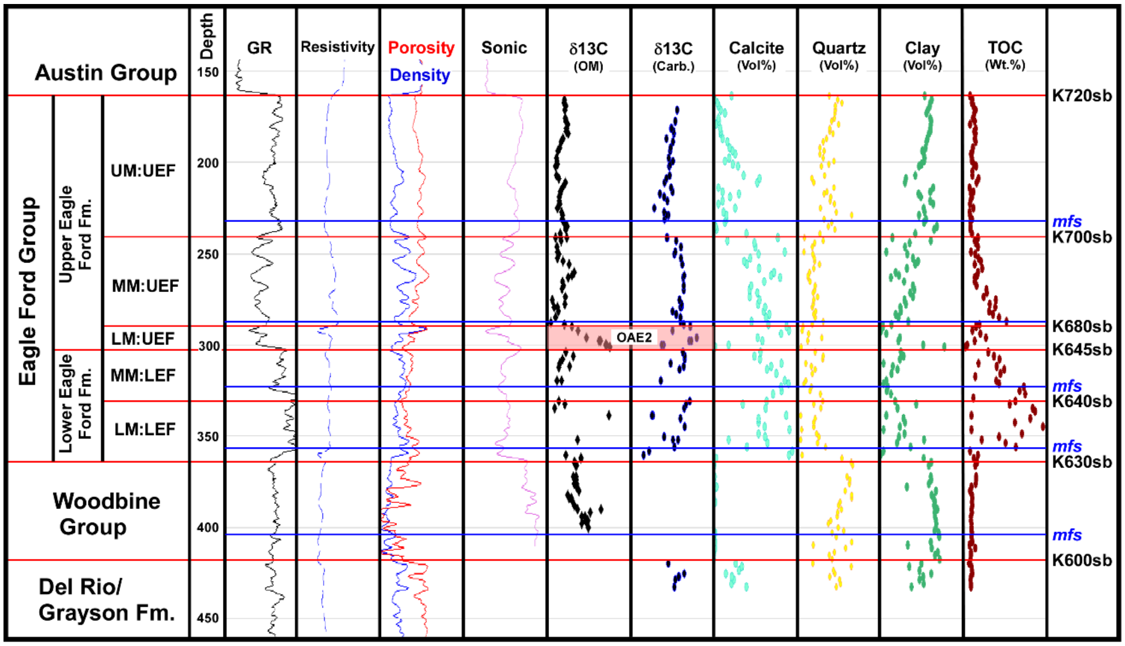

Figure 4. USGS GC-1 research borehole overlain with important stratigraphic surfaces. The Woodbine Group (bounded by the K600sb and K630sb), has abundant quartz and clay but very low calcite and TOC. The high-resistivity, high-GR Lower member of the Lower Eagle Ford (LM:LEF) unconformably overlies the Woodbine Delta in both outcrop and subsurface. Mapping this zone in the subsurface is a key to understanding the depositional profile of the Woodbine Group. The Upper Member of the Upper Eagle Ford (UM:LEF), or Harris Delta, is not present in this well. The LM:UEF in this well is bounded by the K645sb and K680sb and coincides with the onset of the OAE-2. The three members of the Upper Eagle Ford Formation are combined in Figures 7-9 for simplicity. Modified from Donovan (2019).

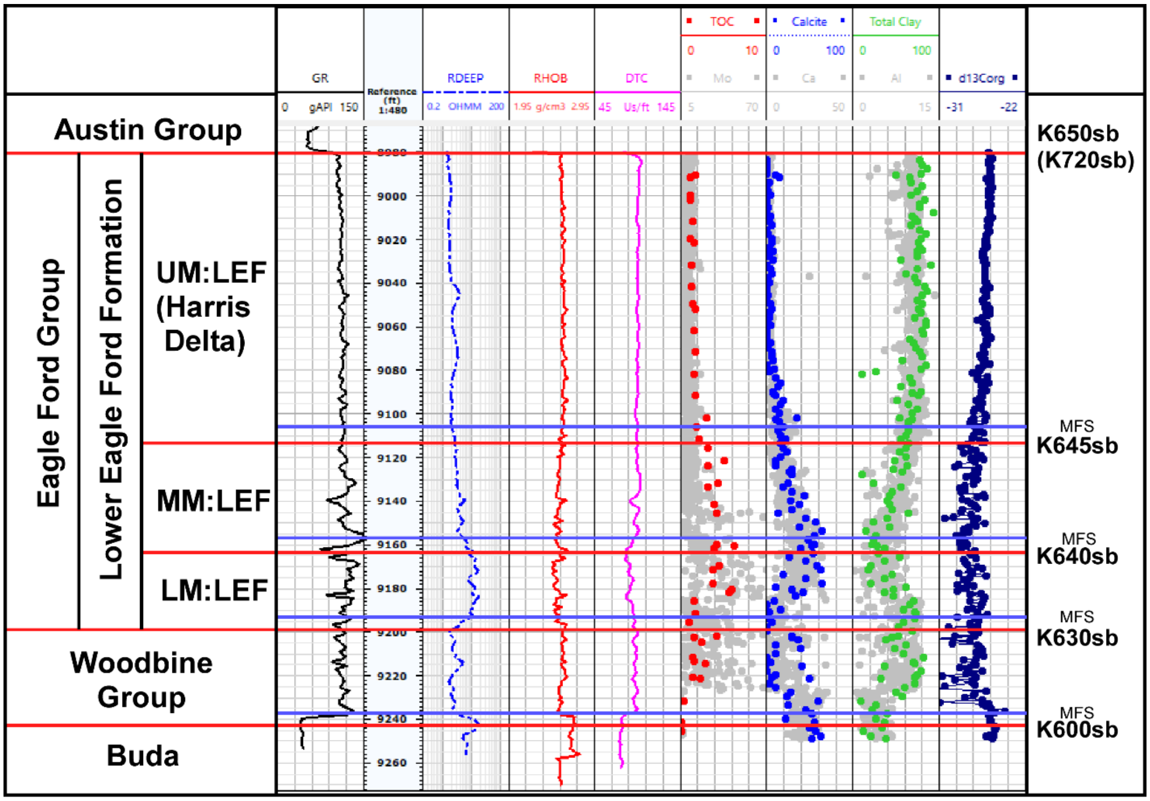

Figure 5. Well D wireline log from Burleson County, Texas, overlain with this paper's nomenclature. The five original Eagle Ford geochemical zones (Meyer, 2018) have been reduced to three based on this paper's correlations. The Lower Member of the Lower Eagle Ford Formation (LM:LEF) unconformably overlies the Woodbine Group. The Middle Member of the Lower Eagle Ford (MM:LEF), and the Upper Member of the Lower Eagle Ford (UM:LEF), or Harris Delta, account for much of the strata in the southern East Texas Basin (ETB). The southern ETB is dominated by Lower Eagle Ford strata whereas the northern ETB is dominated by the Upper Eagle Ford. The UM:LEF is truncated by the K720sb which marks the base of the Austin Group. Modified from Meyer (2018).

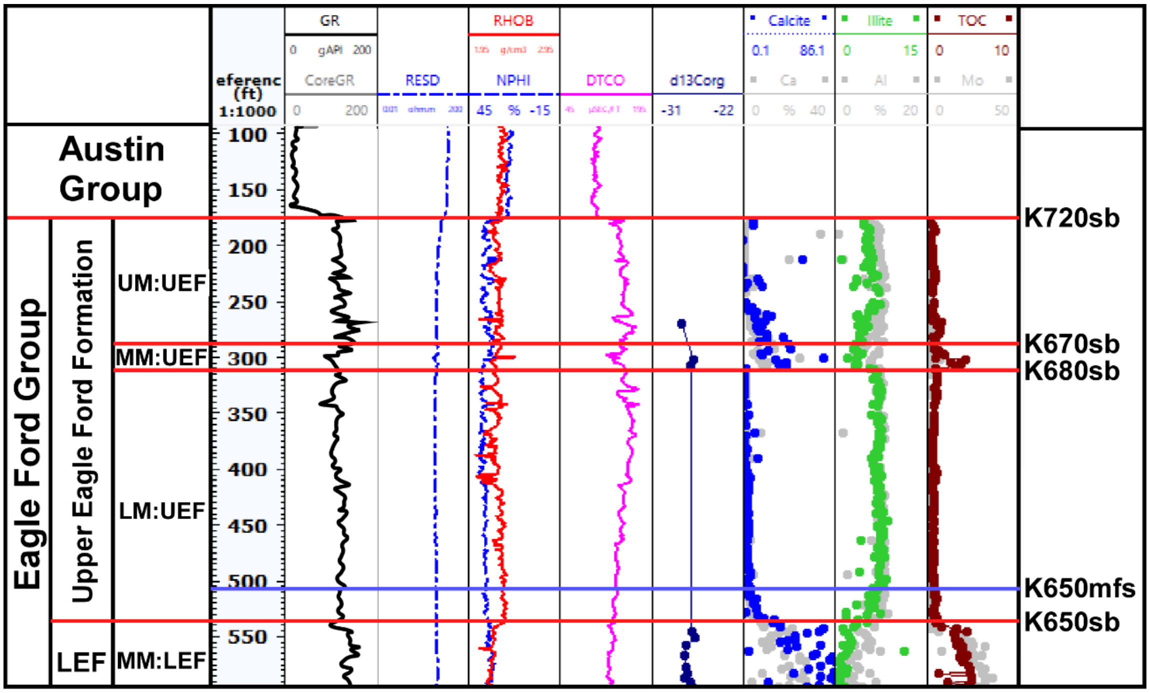

Figure 6. GC-2 wireline well log overlain with the key surface markers. The Middle Member of the Lower Eagle Ford (MM:LEF) marks the last moderate-TOC zone within the Eagle Ford Group. The MM:LEF is bounded on top by the K650sb, which is normally associated with the UM:LEF (Harris Delta), but the UM:LEF laps out before reaching the GC-2 so the younger surface is carried through. The three members of the Upper Eagle Ford Formation are best developed in the northern East Texas Basin (ETB). The Lower Member of the Upper Eagle Ford (LM:UEF), or K650 Sequence, is equivalent to the Latest Cenomanian Upper Britton Formation defined by Kennedy (1988). The ammonites within this unit correspond to the same ammonite zone within the basal 6ft (2m) of the Upper Eagle Ford Formation (Units C1 & C2) in Lozier Canyon in West Texas (Cobban et al., 2008; Donovan, 2016) and the type localities of the Lower and Upper Eagle Ford Formations (Donovan, 2016).

Many of the key regional sequence-stratigraphic surfaces outlined in this study are illustrated on the USGS GC-1 well log (Figure 4). The corresponding GR and resistivity values are shown in Table 1. Significant facies variability occurs within the study interval and these values are only useful as a beginning guide.

This borehole is close to the classic Cloice Branch outcrop described by Adkins and Lozo (1951) and substantiates their interpretations, as well as those of Boling (2013) and Donovan et al. (2015, 2019). A key reference point in this well is the presence of the classic $\delta^{13}C$ positive isotope excursion, which marks the onset of the OAE-2. This isotope excursion also marks the base of the Upper Eagle Ford Group across many parts of Texas as outlined by (Donovan et al., 2015, 2019; Donovan, 2016).

Building on the work of Meyer (2018), this study expanded the geochemical zones away from Burleson County to the northern and eastern portions of the ETB. Meyer's research indicates that the Woodbine and Eagle Ford Group mudstones in the southern ETB can be successfully differentiated using XRF and carbon and oxygen isotope data (Figure 6). These zones appear to match geochemical observations from the GC-1 and GC-2 cores.

Most importantly, the Woodbine Group defined by Meyer (2018) is a carbonate- and TOC-poor, silica- and clay-rich mudstone underlying Eagle Ford sediment also occurs in the GC-1, and similarly defined in the outcrop belt, allowing a high-confidence correlation to occur between these two wells. Extending the correlations from these two wells provides greater confidence in the accuracy of well log picks across the project. The Eagle Ford Group interval overlying the Woodbine in Well D belongs to the Lower

Eagle Ford Formation (LEF). Isotope work performed at Texas A&M University confirmed the absence of the OAE-2 as well as Upper Eagle Ford Formation (UEF) strata in Well D.

Unit	Gamma Ray value	Resistivity value
UM:UEF	150	130
MM:UEF	115	150
LM:UEF	110	135
UM:LEF	175	140
LM:LEF	190	150

Table 1. Summary of approximate gamma ray and resistivity values for the Eagle Ford Group interpreted from the GC-1 well log. Key for Units: The Lower Member of the Lower Eagle Ford (LM:LEF); Middle Member of the Lower Eagle Ford (MM:LEF); Upper Member of the Lower Eagle Ford (UM:LEF); Lower Member of the Upper Eagle Ford (LM:UEF); Middle Member of the Upper Eagle Ford (MM:UEF); Upper Member of the Upper Eagle Ford (UM:UEF).

DISCUSSION

Data from the GC-1, GC-2 and, and Well D in Burleson County (Figures 4-6), were key to defining the chemo-stratigraphic and petrophysical signatures of Woodbine and Eagle Ford Groups, as well as for defining the K600sb, which separates these units, and the K650sb that separates the Lower and Upper Eagle Ford Formations. The cores from these wells (Figures 5-6) also provide invaluable data for defining the K630, K640, and K645 Sequences, within the Lower Eagle Ford Formation, as well as their associated sequence boundaries and maximum flooding surfaces.

The work of Meyer et al. (in press) clearly differentiated the Woodbine and Eagle Ford Groups in the southern ETB by chemostratigraphic and petrophysical characteristics for the first time. In this work, the Woodbine Group was defined as a low-resistivity, organic-poor, argillaceous mudstone, bounded by the K60sb (*now K600sb*) at its base and the K63sb (*now K630sb*) at its top (Figure 5). This stratigraphic unit and its associated bounding surfaces were used to define the Woodbine Group across our study area. The sandstones within this unit define the various marginal-marine and fluvial plays and play fairways of the Woodbine Group. Meyer et al. (in press) also defined the overlying Lower Member of the Lower Eagle Ford Formation (LM:LEF), the K630 Sequence of this study, as a high-resistivity, organic-rich carbonate mudstone (Figure 5). The organic-rich carbonate mudstones in K630 Sequence defines the source rock play in the ETB, thus, its distribution defines the play fairway. Above the K63 (new K630)

Sequence, Meyer defined an Upper Member of the Lower Eagle Ford Formation (UM:LEF), the K640 Sequence of this study, as a mudstone-prone interval showing decreasing resistivity, carbonate, and organic content upwards (Figure 5). Finally, Meyer et al. (in press) defined a low-resistivity, argillaceous mudstone-prone, sequence that defined the onset of Harris Delta deposition within the region. Based on regional correlations, we have defined the uppermost low-resistivity, argillaceous mudstone-prone unit at the top of the Eagle Ford Group in Well D as the K645 Sequence. The K645 mfs of this study coincides with the same classic top resistivity marker recognized by Turner and Conger (1984). Sandstones within the K645 Sequence of this study define the marginal marine and fluvial plays and play fairways of the Late Cenomanian Harris Delta.

The same general chemostratigraphic and petrophysical characteristics were recognized in the GC-1 (Figure 4) and GC-2 (Figure 6) research boreholes as well, and were used to define the K600 (Woodbine), K630 Lower Member of the Lower Eagle Ford (LM:LEF), and K640 Middle Member of the Lower Eagle Ford (MM:LEF) sequences and their bounding surfaces. Correlations from the GC-2 well, and nearby outcrops in Dallas (Kennedy, 1988) were fundamental to defining the Upper Eagle Ford Formation, and its associated K650sb (lower) and K720sb (upper) bounding surfaces (Figure 6). The K650mfs, as defined in this well, is a distinctive low resistivity petrophysical marker used to map the Upper Eagle Ford Formation into the southern portions of the ETB. In this well (Figure 5), the K650sb marks the change from carbonate-prone strata of the Lower Eagle Ford Formation (below) to argillaceous-rich strata of the Upper Eagle Ford

Formation (above). The resulting argillaceous-rich K650 Sequence in this well equates to the Latest Cenomanian Upper Britton Formation defined by Kennedy (1988). The ammonites within the thick K650 Sequence in the Dallas area (Figure 5), correspond to the same ammonite zone within the basal 6ft (2m) of the Upper Eagle Ford Formation (Units C1 & C2) in Lozier Canyon in West Texas (Cobban et al., 2008; Donovan, 2016) and the type localities of the Lower and Upper Eagle Ford Formations (Donovan, 2016). This member in the GC-1 is only about 15ft (5m) thick and corresponds with the onset of the OAE-2.

Regional correlation of the K650sb and K650mfs toward the southern portions of the ETB (Figures 7-9) revealed that the bulk of the Eagle Ford Group in the southern portions of the basin represents LEF strata, which sits stratigraphically below the K650sb. Within this regional sequence stratigraphic framework, the Harris Delta represents a previously unrecognized Late Cenomanian (K645) depositional sequence, defined by the K645sb at its base and the K650sb at its top. This new interpretation is now in alignment with the ages proposed by Denne et al. (2016) for the Harris Delta. It is also noted that the results from this regional study differ from our previous work (Meyer et al., in press), which had incorrectly assumed that the classic top resistivity marker was the K680 mfs within the UEF, and not the K645 mfs within the LEF.

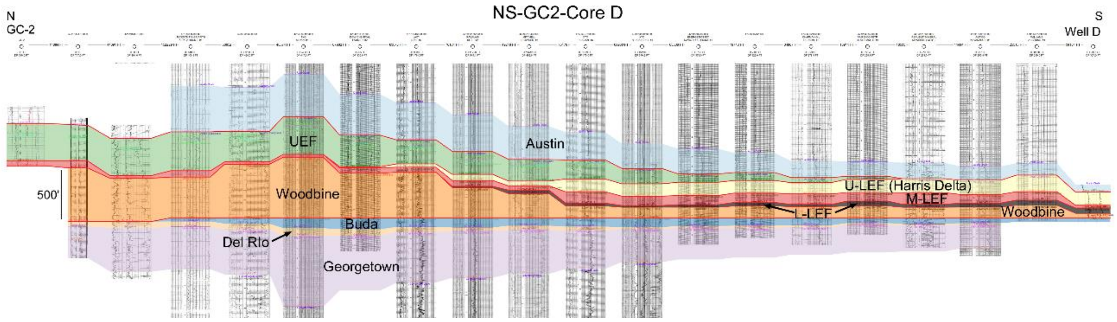

Figure 7. GC-2 to Well D cross section hung on the Buda. This regional north-to-south cross section shows the distribution and thickness of the Georgetown through the Austin Group. The Austin Group and Buda Formation through the Georgetown are shown for reference but are not a focus of this study. The Woodbine Delta prograded in a southwestward direction into the basin, thinning significantly to the south and west. Recognizing the high-resistivity, high gamma ray Lower Member of the Lower Eagle Ford (LM:LEF) and its distribution in the southern East Texas Basin is key to unraveling the depositional profile of the Woodbine Delta. The Middle Member of the Lower Eagle Ford (MM:LEF), and Upper Member of the Lower Eagle Ford (UM:LEF) comprise much of the Eagle Ford Strata in the southern ETB, while the Upper Eagle Ford Formation (UEF) is thickest in the northern ETB. The UM:LEF (Harris Delta) was deposited into the remaining free accommodation space of the Woodbine Delta front. The Harris Delta and Woodbine Delta, although similar in facies and composition, are two distinct, unconformity-bounded units deposited in different times and locations.

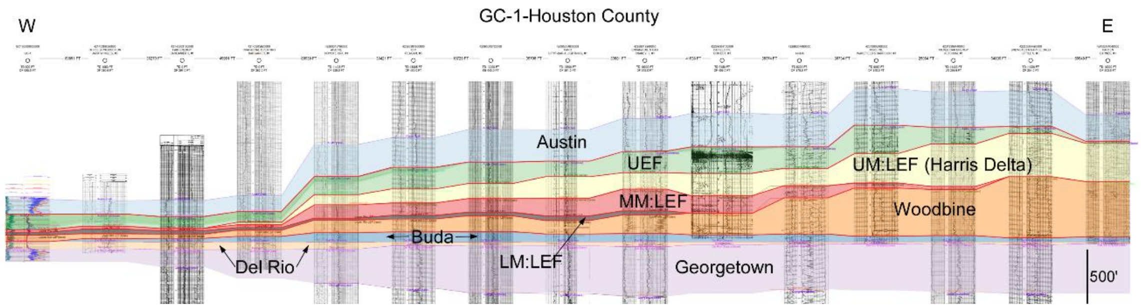

Figure 8. GC-1 to Houston County cross section hung on the Del Rio. This regional west to east cross section shows similar geometries to Figures 7 & 9. The Woodbine Group thins to the West and Lower Eagle Ford strata onlaps the relict topography. The Lower Member of the Lower Eagle Ford (LM:LEF) and Middle Member of the Lower Eagle Ford (MM:LEF) lap out to the east. The Upper Member of the Lower Eagle Ford (UM:LEF), or Harris Delta, directly overlies the Woodbine Group in the easternmost boundary of this study. The Harris Delta may contain reworked sediment from both the Woodbine Group and the MM:UEF. The Upper Eagle Ford Formation (UEF) is composed of three distinct members in the stratigraphic columns but simplified to one unit is Figures 7-9 & 16. The UEF is truncated by the K720sb (base Austin Group).

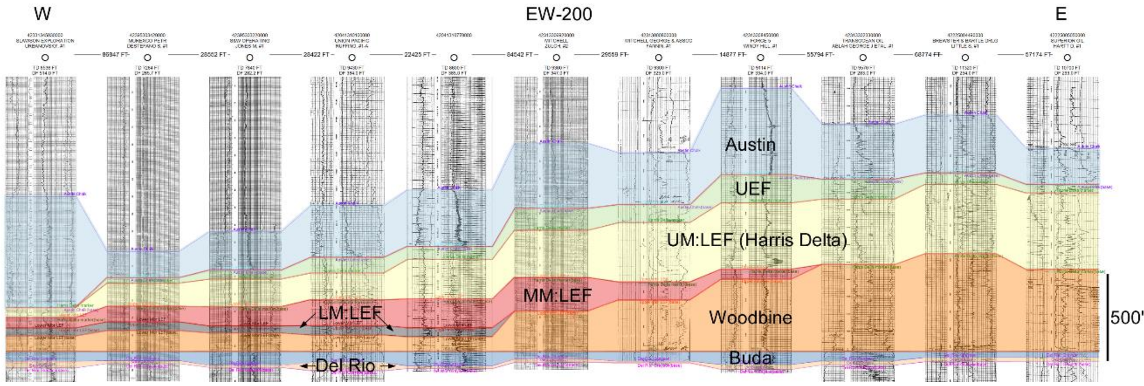

Figure 9. EW-200 cross section hung on the Buda. This regional west-to-east cross section starts in Milam County and ands in Houston County. It shows a similar depositional profile to Figures 7 & 8. This cross section shows the high-resistivity zone associated with the Lower Member of the Lower Eagle Ford (LM:LEF). This unit rapidly thins to the east as it onlaps the Woodbine Group foresets. The Upper Member of the Lower Eagle Ford (UM:LEF), or Harris Delta, is well developed on the eastern margin of this cross section, and directly overlies the Woodbine Group. The Harris Delta is likely composed of both reworked Woodbine and Middle Member of the Lower Eagle Ford (MM:LEF) sediment. The K720sb (base Austin Group) successively truncates underlying Eagle Ford strata to the west and east.

The Cashco Saunders well in Grimes County (Figures 1 & 10) is this study's type well for the southern ETB. It was also used by Hentz et al. (2014) on their regional cross section. In this well, our interpretations of the Georgetown, Del Rio/Grayson, Buda, Woodbine, Eagle Ford, Austin, and associated boundaries and key interpreted surfaces are presented. For context (Figure 10), previous workers, such as Hentz et al. (2014) and Turner and Conger (1984), included the K630, K640, and K645 Sequences of this study as part of the Woodbine Group. Also note that Hentz et al. (2014) referred to the K630 and K640 Sequences of this study respectively as the Lower and Upper Maness Shale. In this study only the K630 Sequence belongs to the Woodbine Group (Figure 10).

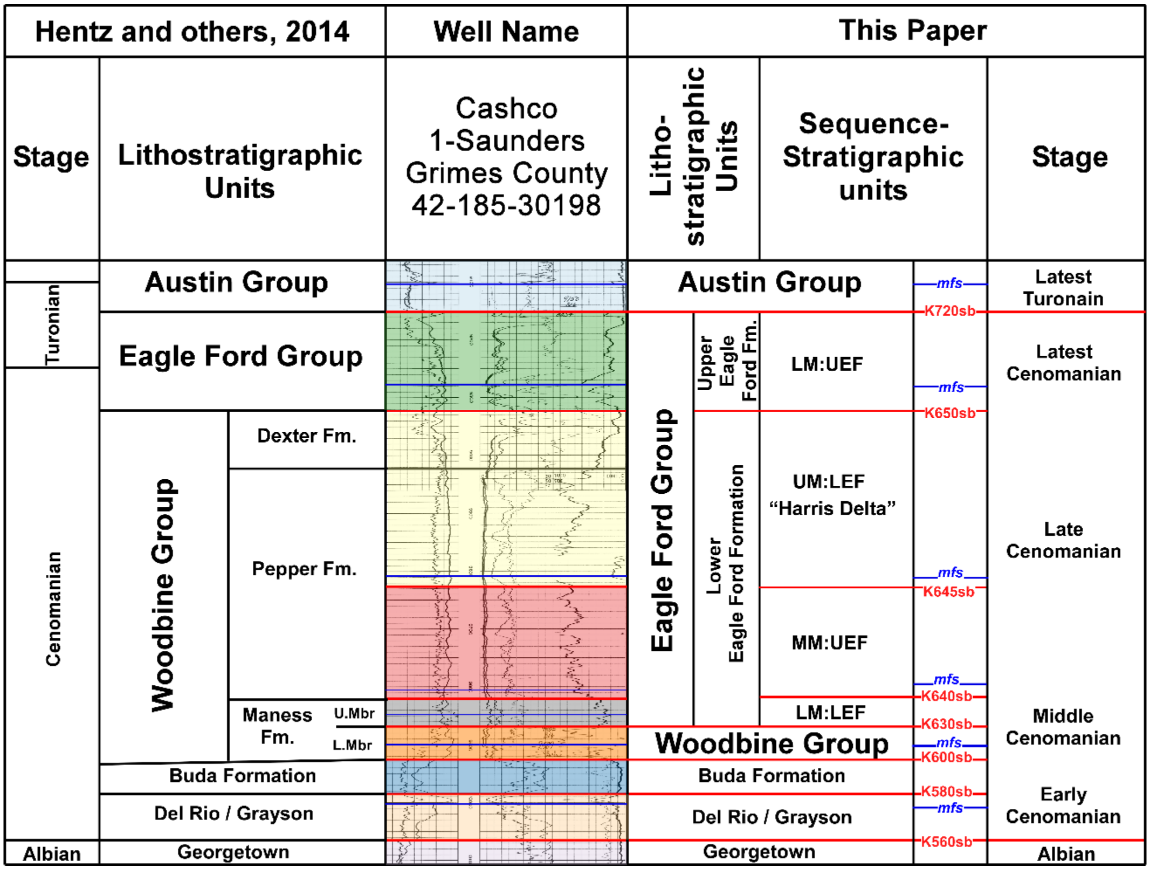

Figure 10. Table comparing a common lithostratigraphic interpretation of a sandy interval in Grimes County with this paper’s interpretation based on our sequence study. Eagle Ford source rocks overlie Woodbine (Pepper) mudstone. The Upper Member of the Lower Eagle Ford (UM:LEF) was a significant unit in the southern ETB, accounting for much of the thickness of the Lower Eagle Ford Formation. The UM:LEF, or Harris Delta, is well developed in this log. The Middle and Upper members of the Upper Eagle Ford are truncated by the K720sb. Modified after Donovan et al., 2019.

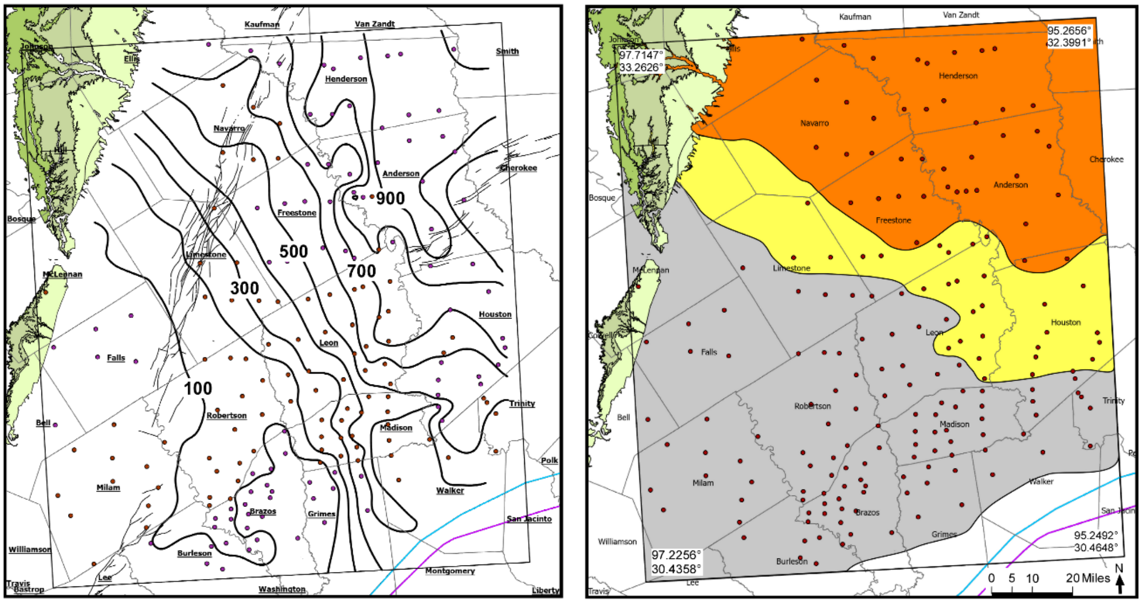

Figure 11. Isopach map of the K600 Sequence (Woodbine Group). Contour interval=100'. The Woodbine Delta system prograded into the East Texas Basin in a southwestward direction, setting up the topographic profile that controlled much of the Lower Eagle Ford Formation depositional trends. Paleogeographic map of the Woodbine Group. Orange=>50% net sand, Yellow=10-50% net sand, gray=<10% net sand.

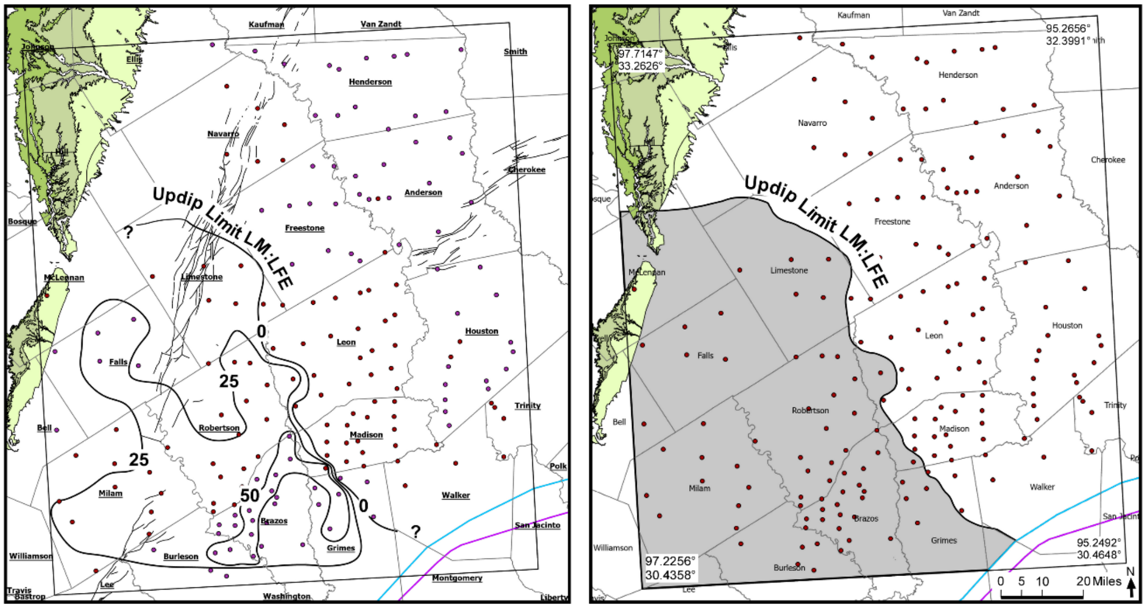

Figure 12. Isopach map of the K630 Sequence (LM:LEF, Lower Member of the Lower Eagle Ford). The high-resistivity, high-TOC Eagle Ford source rocks within this unit onlap the relict topography of the Woodbine Delta and only occur overlying the thin distal Woodbine (Pepper) mudstones. Paleogeographic map showing the areal extent of the LM:LEF. This unit is entirely mud prone.

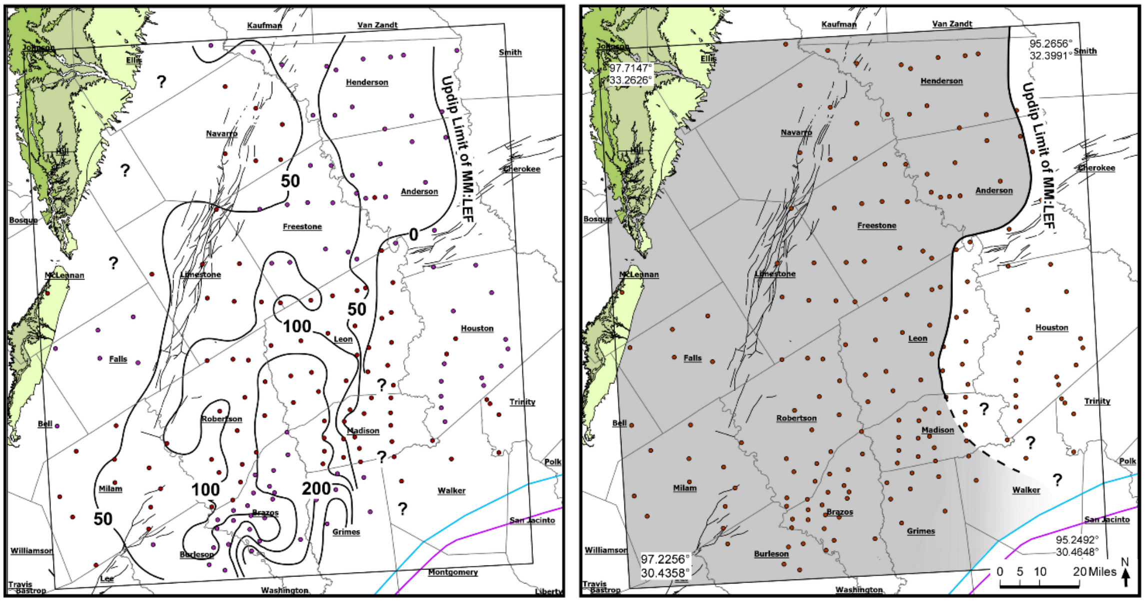

Figure 13. Isopach map of the K645 Sequence (MM:LEF, Middle Member of the Lower Eagle Ford). Contour interval=50' (15m). This unit appears to lap out or be truncated by the overlying Harris Delta to the east. The MM:LEF is thickest in Brazos, Grimes, and Madison counties. It didn't completely fill in the accommodation space left by the Woodbine Delta. This unit was not extensively mapped in the northwest corner of the study area. Paleogeographic map showing the areal extent of the MM:LEF. This unit is comprised of mudstones with less than 10% net sand.

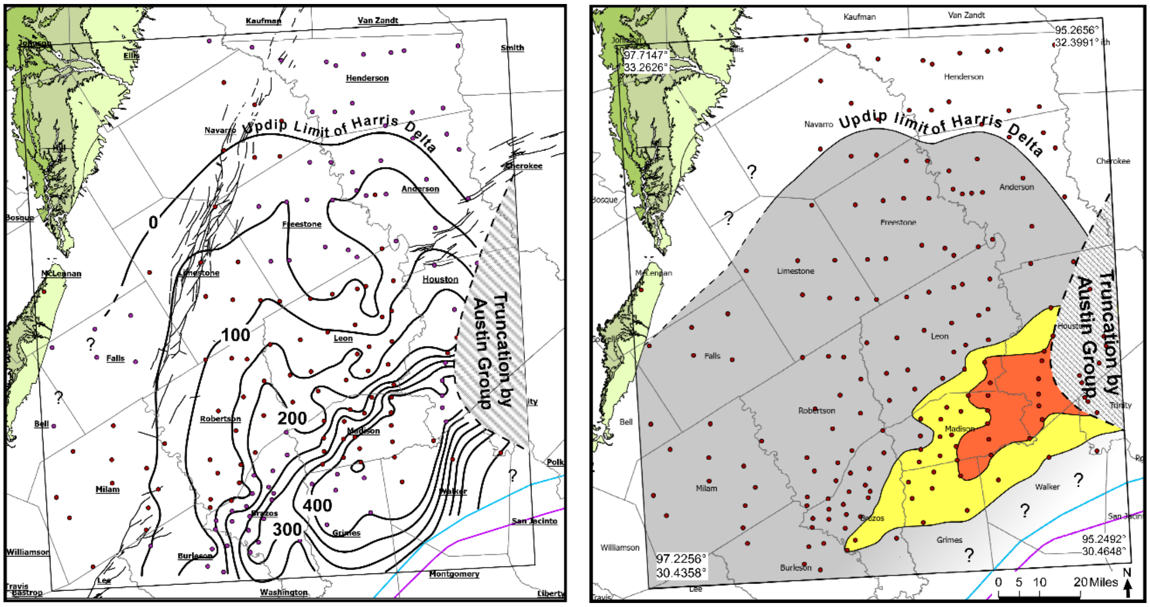

Figure 14. Isopach map of the K650 Sequence (UM:LEF, Upper Member of the Lower Eagle Ford), also known as the Harris Delta. Contour interval=50' (15m). The Harris Delta and underlying MM:LEF (Middle Member of the Lower Eagle Ford) filled in most of the paleotopography of the Woodbine Delta. To the east the Harris Delta is truncated by the K720sb (base Austin Group). To the north the Harris Delta thins as it onlaps the MM:LEF and relict topography of the Woodbine Delta. This study did not investigate these units south of the Edwards and Sligo shelf margins. Paleogeographic map of the K645 Sequence: Orange=>50% sand, Yellow=10-50% sand, gray=<10% sand.

Based on the grid of well log cross sections noted on Figure 1, a regional surface-based sequence stratigraphic framework was extended across the study area and the resulting correlations are documented on Figures 7-9. The isopach and facies maps that resulted from these correlations are presented as Figures 11-14. The cross sections and maps indicate that the Early Cenomanian Woodbine Group prograded in a southwesterly direction into the basin, becoming thinner and muddier (Figures 7-9,11). The Woodbine Group, or the K630 Sequence of this study, ranges from over 1000ft (300 m) thick in the northeast corner of the study area, to less than 100ft (30 m) in the southwest corner (Figure 11).

Our study also indicates that defining the inherited paleo-topography of the Woodbine Delta was key to understanding and predicting the spatial distribution of sequences within the overlying Lower Eagle Ford Formation. The resulting Middle to Late Cenomanian Lower Eagle Group (K630, K640, & K645 Sequences) is younger than the Woodbine Group and onlaps the Woodbine Delta (Figures 7-9). One question that wasn't answered by this study is whether the Woodbine Delta prograded over the Lower Cretaceous shelf margins in Walker, Trinity, and Polk counties as previously reported by Bunge (2007). This study area is the focus of ongoing research at Texas A&M University.

The K630 Sequence, or LM:LEF, is bounded by the K630sb at its base and the K640sb at its top. This sequence contains the organic-rich, carbonate-prone mudstones, which are the primary target for unconventional source rock exploitation in South Texas, as well as in the East Texas Basin. This sequence is geographically restricted to the southwest portions of the study area (Figure 12). This unit is approximately 50ft (15m) thick in Brazos and Grimes counties and rapidly thins to the north and east as it onlaps the depositional slope of the underling Woodbine Delta. Where present, this unit typically overlies the thin basal mudstone of the Woodbine Group and is easily distinguished from them because of its distinctive high-GR and resistivity signatures (Figure 5). As mentioned previously, recognizing this zone is vital to understanding the paleotopography of the Woodbine Delta because this mudstone defines the onset of Eagle Ford Group deposition and end of the Woodbine Group deposition. The K640 Sequence, or MM:LEF, is bounded by the K640sb at its base and the K645sb at its top.

This unit is a carbonate-prone mudstone with moderate organic content that directly overlies the LM:LEF (Figure 5). In Well D (Figure 5) it is characterized by an upwards decreasing resistivity and GR signatures, apparently driven by an upward decrease in both carbonate and organic content. The unit is over 200ft (60 m) thick in Grimes, Madison, and Brazos counties and thins to the north and west (Figure 13). The MM:LEF appears to lap out eastward on the sandy portions of the Woodbine Delta. This unit infills significant topographic relief in front of the Woodbine Delta, tightly controlling the available accommodation space for the K645 Sequence, which contains strata of the Harris Delta. However, this unit didn’t fill the accommodation space completely in Walker, eastern Madison, or Houston counties like it did to the northwest. This unit is almost entirely muddy, with thin intermittent sands representing less than 10% net-to-gross.

The K645 Sequence, or the UM:LEF of this study, is bounded by the K640sb at its base and the K645sb at its top. This unit is important because it contains the Late Cenomanian southwestward prograding Harris Delta System. Granata (1963) and Nichols (1964) hypothesized that the Harris Delta is composed of reworked Woodbine sediment due to movement on the Sabine Uplift. However, since the Harris Delta directly overlies the Woodbine Group in the eastern portions of our study area with no underlying older Eagle Ford strata (Figures 8 & 9), it seems likely that the Harris Delta could be composed of reworked older Eagle Ford Group, as well as Woodbine Group, sediments. The mudstone-prone natures of both the K630 and K640 Sequences (Figure 8 & 9), also suggests that these units are, in part, erosional remnants, whose more sandstone-prone facies were truncated by the overlying K645 sequence boundary.

Across the study area, the K645 Sequence (Figure 14), which ranges from 0-400ft (120 m) thick, is centered on Grimes, Walker, Madison, and Houston counties (Figure 14). The thickest portions of this sequence also coincide with the sandiest facies (Figure 14). The K645 Sequence also abruptly thins inboard of the Lower Cretaceous shelf margins, which Turner and Conger (1984) also suggested for the Harris Delta. The Austin Chalk truncates the Harris Delta on the eastern margin of the study area (Figure 10). As the Harris Delta prograded to the southwest it filled in the remaining accommodation space on the front of the Woodbine Delta. Figure 15 illustrates the generalized juxtaposition between the sandy intervals of the two groups and how they differ both in origin and positioning. Interestingly, the UM:LEF (Harris Delta) is not present in the GC-1 or GC-2 because the Harris Delta was prograding in a southwesterly direction and laps out toward the northwest (Figure 14). The overlying K650sb may also have played a role in modifying the primary distribution of the K645 Sequence, by truncating it to the north and west (Figure 14).

Figure 15 places the Harris Delta and Woodbine Delta in context with each other. These two delta systems occupied different regions of the basin at different times. The Harris Delta was primarily deposited in unfilled accommodation space left by the prograding Woodbine Delta (K600 Sequence). Within the chronostratigraphic framework of this study, the oil-producing sandstone beds at Kurten Field (Turner and Conger, 1984), which have long been associated with the Woodbine Group, are reinterpreted as the downdip equivalents of the Harris Delta, within the K645 Sequence of the Eagle Ford Group.

The Upper Eagle Ford Formation consists of the K650, K680, and K700 Sequences (Figure 2). These units, however, are best developed within the northern portions of the basin and are also a focus of ongoing research at Texas A&M University. For this study, Upper Eagle Ford strata were combined as one unit bounded by the K650sb at its base and the K720sb at its top, which marks the base of the Austin Chalk (Figure 2). An isopach map of the UEF (Figure 16) shows thickness variation from over 400ft (120 m) to the north, to less than 100ft (30 m) toward the south.

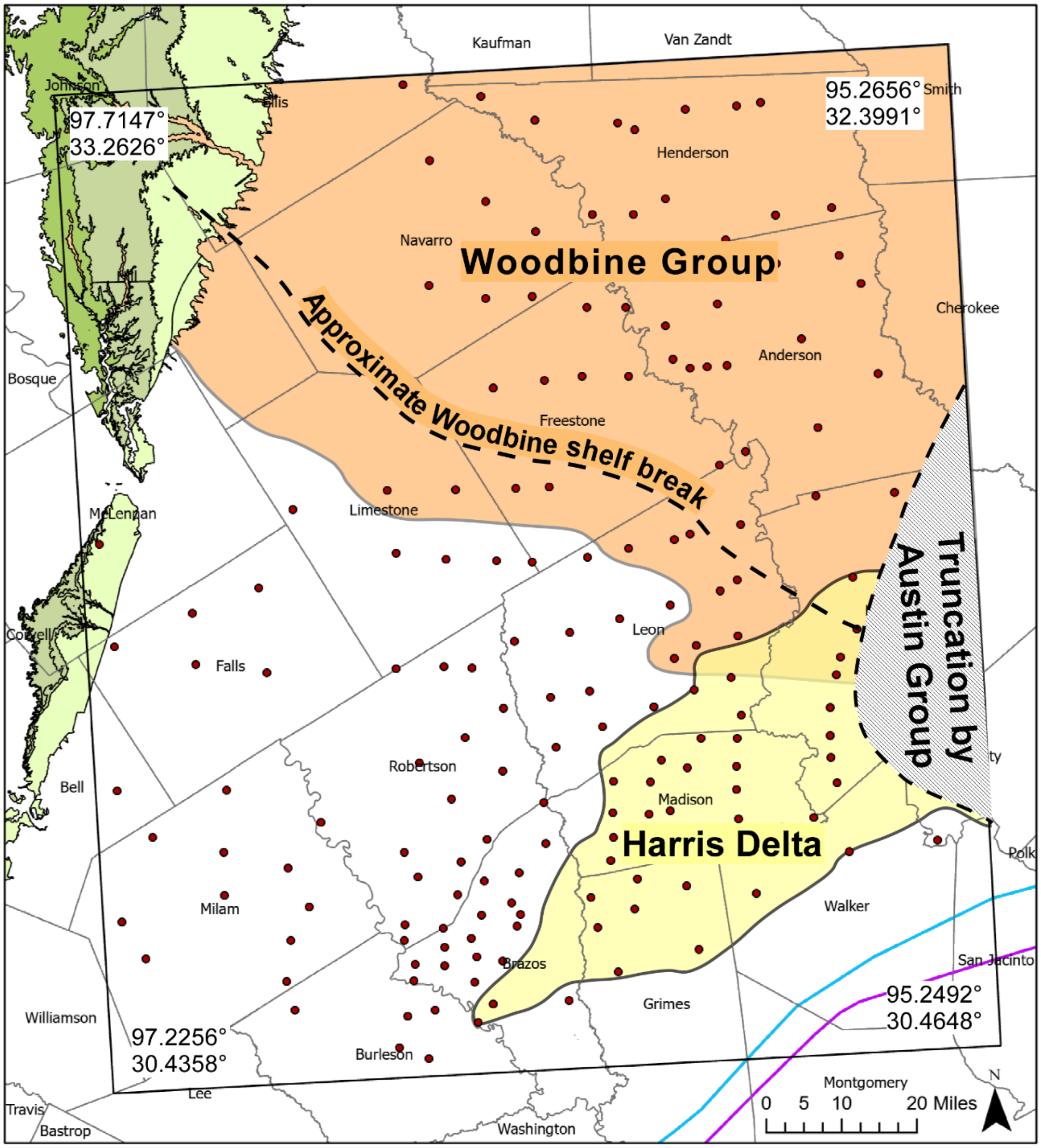

Figure 15. Generalized relationships between the Early Cenomanian Woodbine Delta (K600 Sequence) and Late Cenomanian Harris Delta (K645 Sequence). The Harris Delta filled in the depositional topography produced by the prograding Woodbine Delta. The Harris Delta and Woodbine Deltas are distinct depositional sequences and were deposited in both different times and places. For clarity, this figure omits the MM:LEF (Middle Member of the Lower Eagle Ford) and the LM:LEF (Lower Member of the Lower Eagle Ford) between the Harris Delta and Woodbine Group.

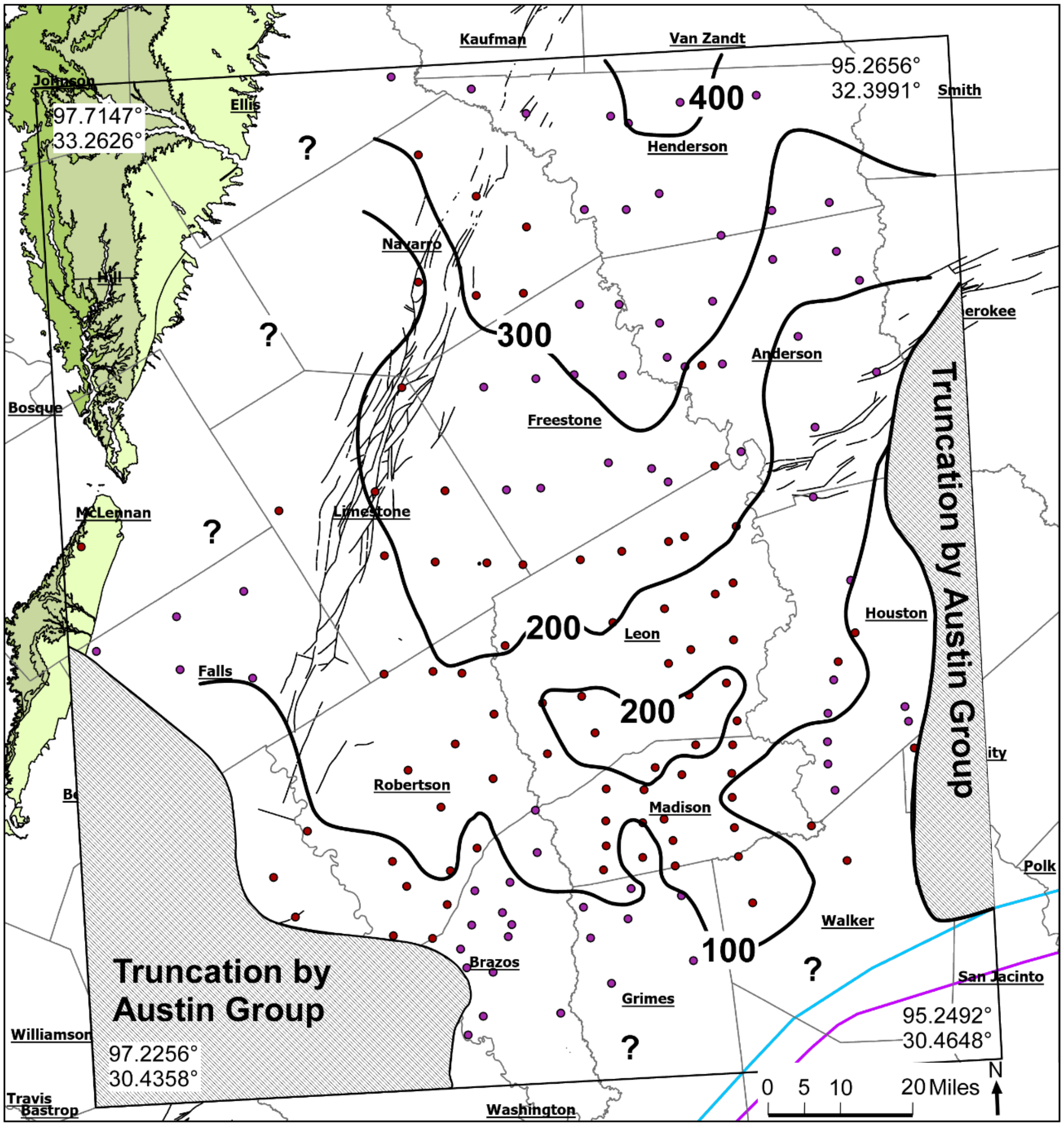

Figure 16. Isopach map of the combined Upper Eagle Ford Formation (UEF). The three members of the UEF shown in the various stratigraphic columns are combined here for simplicity. The thickest Upper Eagle Ford Formation deposition occurred in the northern East Texas Basin. This unit is truncated to the southwest and east by the K720sb and directly underlies the Austin Group. This study did not address the region south of the Edwards and Sligo shelf margins.

DEPOSITIONAL HISTORY

The East Texas Basin in this study encompasses both the classic East Texas Basin and the Brazos Sub-Basin defined by Davidoff (1993). Commanchean carbonate deposition ended with the Albian Buda Formation that was deposited in a tropical, shallow inner-shelf environment in well-oxygenated waters (Reaser and Dawson, 1995). The Buda Limestone provides the carbonate shelf margin on which the Woodbine and Eagle Ford were deposited (Vail et al., 1977). The Early Cenomanian Freestone (Woodbine) Delta prograded into the basin, depositing thick successions of marginal-marine and fluvial sandstone, as well as offshore mudstone. Woodbine progradation ceased and Middle Cenomanian organic-rich Eagle Ford mudstone was deposited over distal Woodbine mudstone, sequentially onlapping as accommodation space was filled.

In the Late Cenomanian, the Sabine Arch was uplifted and shed sediment westward into the ETB as the Harris Delta. During the Latest Cenomanian and Turonian, younger (presently un-named) Eagle Ford delta systems prograded into the ETB from the north. In the latest Turonian, structural movement of the Sabine Uplift and San Marcos Arch produced truncation beneath the K720sb, which modified the primary distribution and thickness of sequences within the underlying Eagle Ford and Woodbine Groups. After a significant hiatus, seas inundated the basin again and deposited the open-marine Austin Group.

Based on our chrono-stratigraphic framework of these Cenomanian-Turonian units, a summary schematic of the play types within the Woodbine and Eagle Ford Groups is shown in Figure 17. These play assignments were divided based on lithology, facies, and major structural features. The Woodbine Group hosts the largest conventional plays in the ETB whereas the Eagle Ford Group is dominated by source rock and tight-rock plays, with the exception of the Harris Delta. These new sequence stratigraphy-based paleogeography maps define these plays across the southern East Texas Basin.

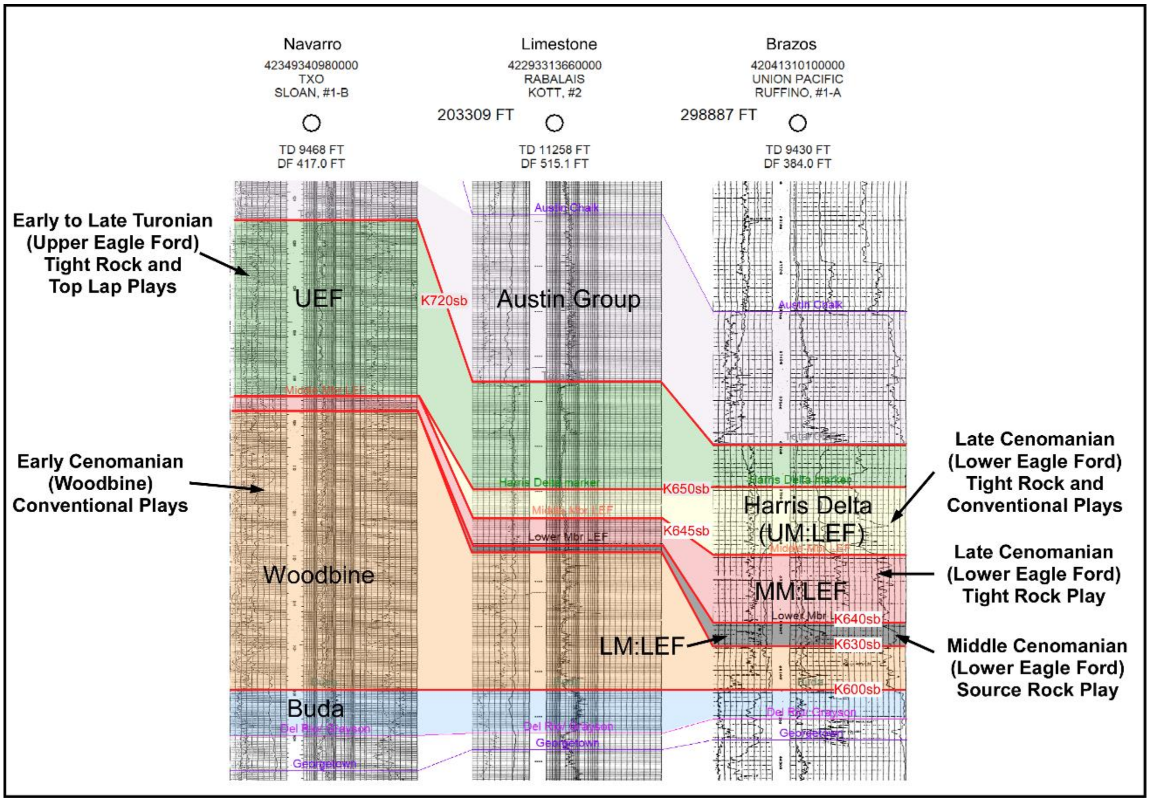

Figure 17. Various plays associated with the Woodbine and Eagle Ford Groups in the East Texas Basin. Play types: Woodbine: Early Cenomanian conventional plays. The Lower Member of the Lower Eagle Ford (LM:LEF): Middle Cenomanian Eagle Ford source rock play. Middle Member of the Lower Eagle Ford (MM:LEF): Late Cenomanian tight rock play. Upper Member of the Lower Eagle Ford (UM:LEF): Late Cenomanian Harris Delta play; conventional and tight-rock play. Upper Eagle Ford (UEF): Early to late Turonian tight rock and top lap plays.

CONCLUSIONS

The Eagle Ford and Woodbine Groups in the East Texas Basin are distinct unconformity-bounded sequences with unique geochemical, isotopic, and well log signatures. By extending key sequence boundaries and maximum flooding surfaces from the outcrop belt and three cores using a grid of cross sections, the groups are successfully defined and differentiated based on depositional geometry (e.g. onlapping/offlapping relationships) and facies distribution. Mapping the K630 Sequence boundary and the areal extent of the overlying LM:LEF was a key to unraveling the depositional profile of the Woodbine Delta system, which in turn helps to constrain the extent and thickness of the overlying Eagle Ford Group. Our study indicates that the Harris Delta is a younger delta system occurring within the K645 Sequence of the Lower Eagle Ford Formation. This sequence, as well as the older K630 and K640 Sequences within the Lower Eagle Ford Formation, infilled the depositional relief left by the prograding (Lower Cenomanian) Woodbine Delta.

Because of the facies similarities between the K600 (Freestone), and the K645 (Harris) Deltas, a regional perspective based on surface (sequence boundary) mapping is necessary to distinguish them from each other. The term “Eaglebine” does injustice to both units and does not accurately reflect the distinct geochemical, geometric, depositional, and temporal distribution of each sequence. Based on the results of this study, new chrono-stratigraphic based isopach and facies maps showing the extent of the

K600 (Woodbine Delta) and K645 (Harris Delta) were made. These maps can be used to define the various conventional and unconventional plays of the Woodbine and Eagle Ford Group, and to understand the distribution, thickness variations, and potential sweet spots of the associated play fairways. Understanding the distribution and thickness of these oil- and gas-bearing units will be crucial in the coming years to support the world's growing energy demand.

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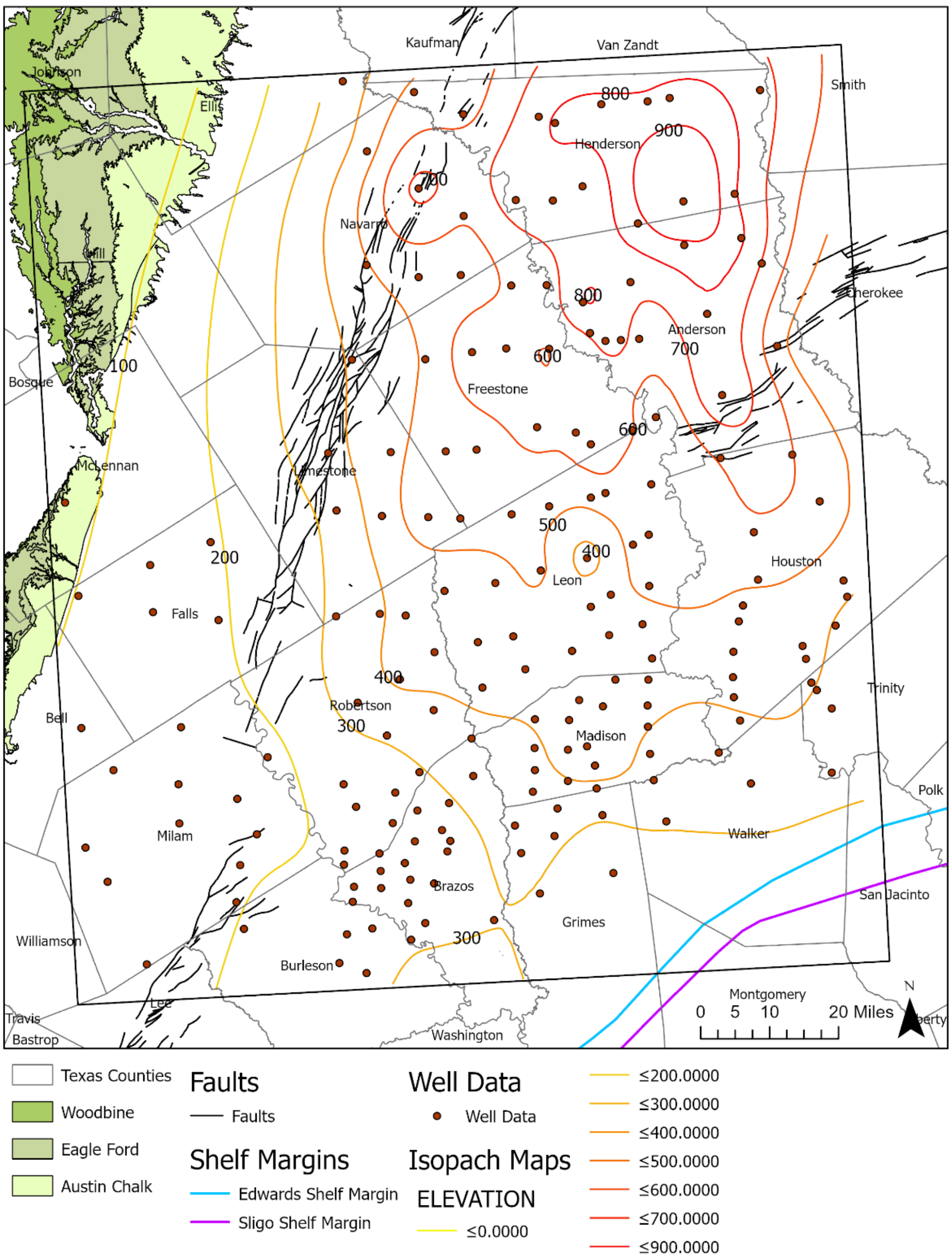
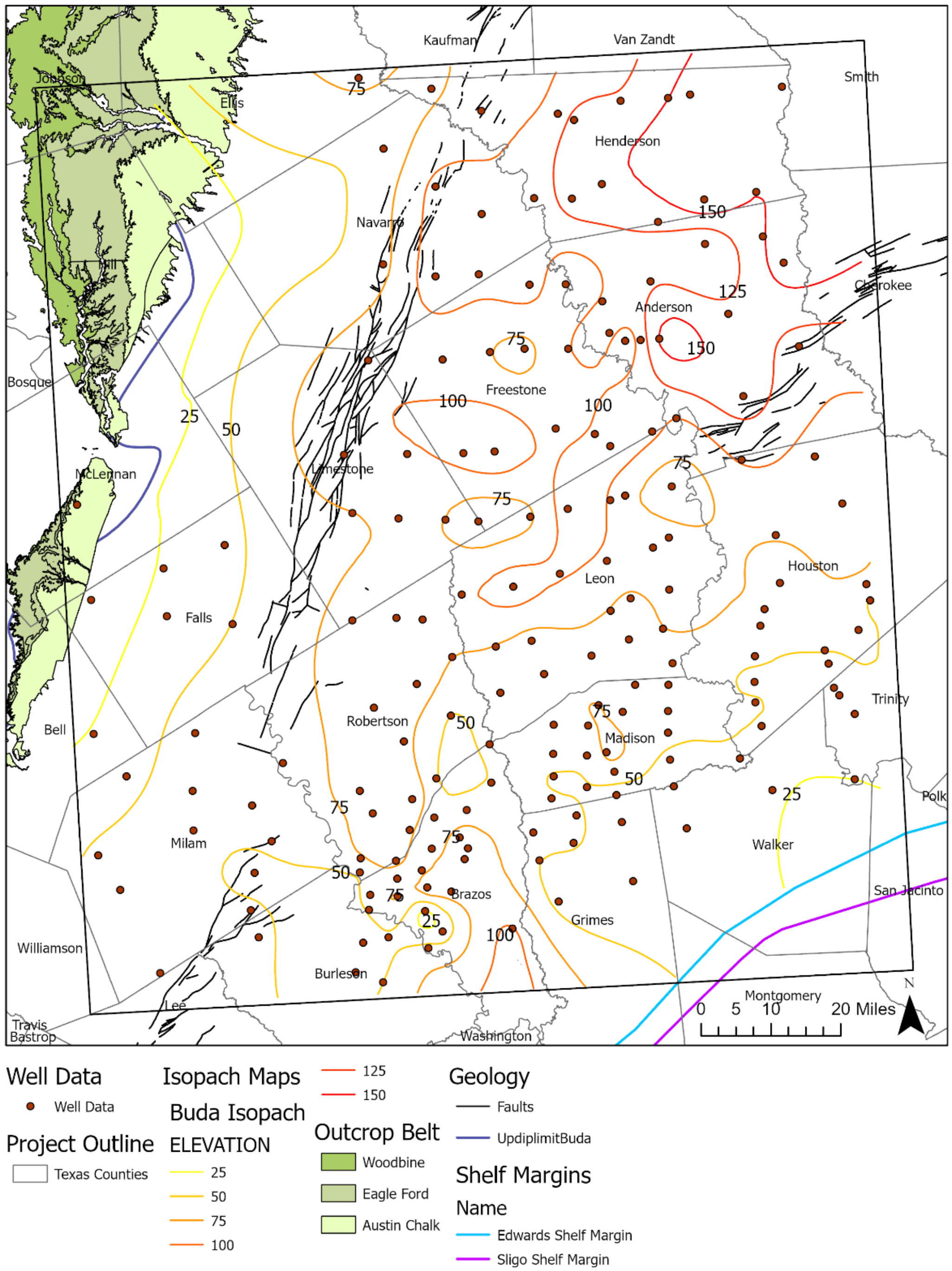
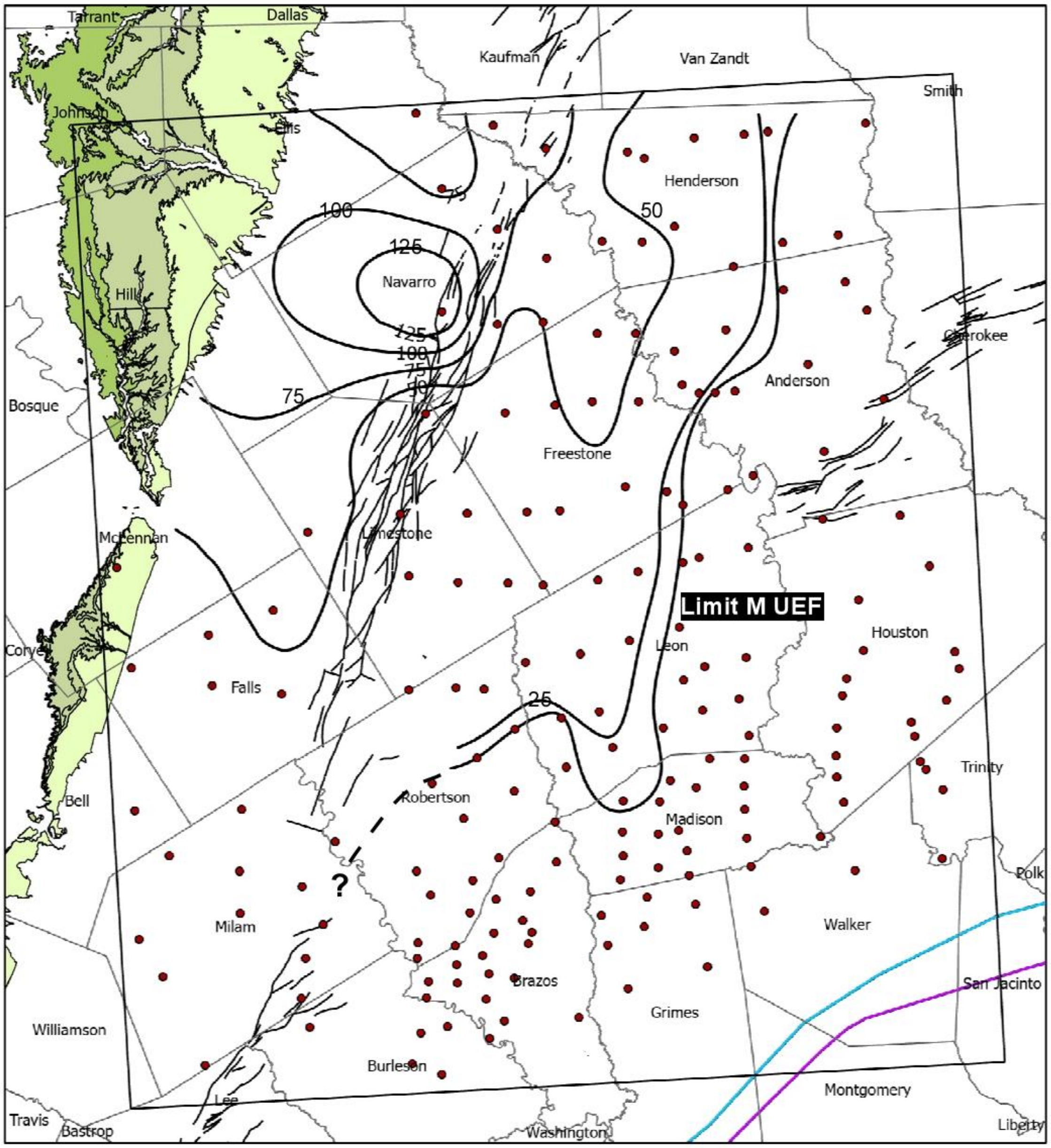
APPENDIX A

Georgetown Isopach

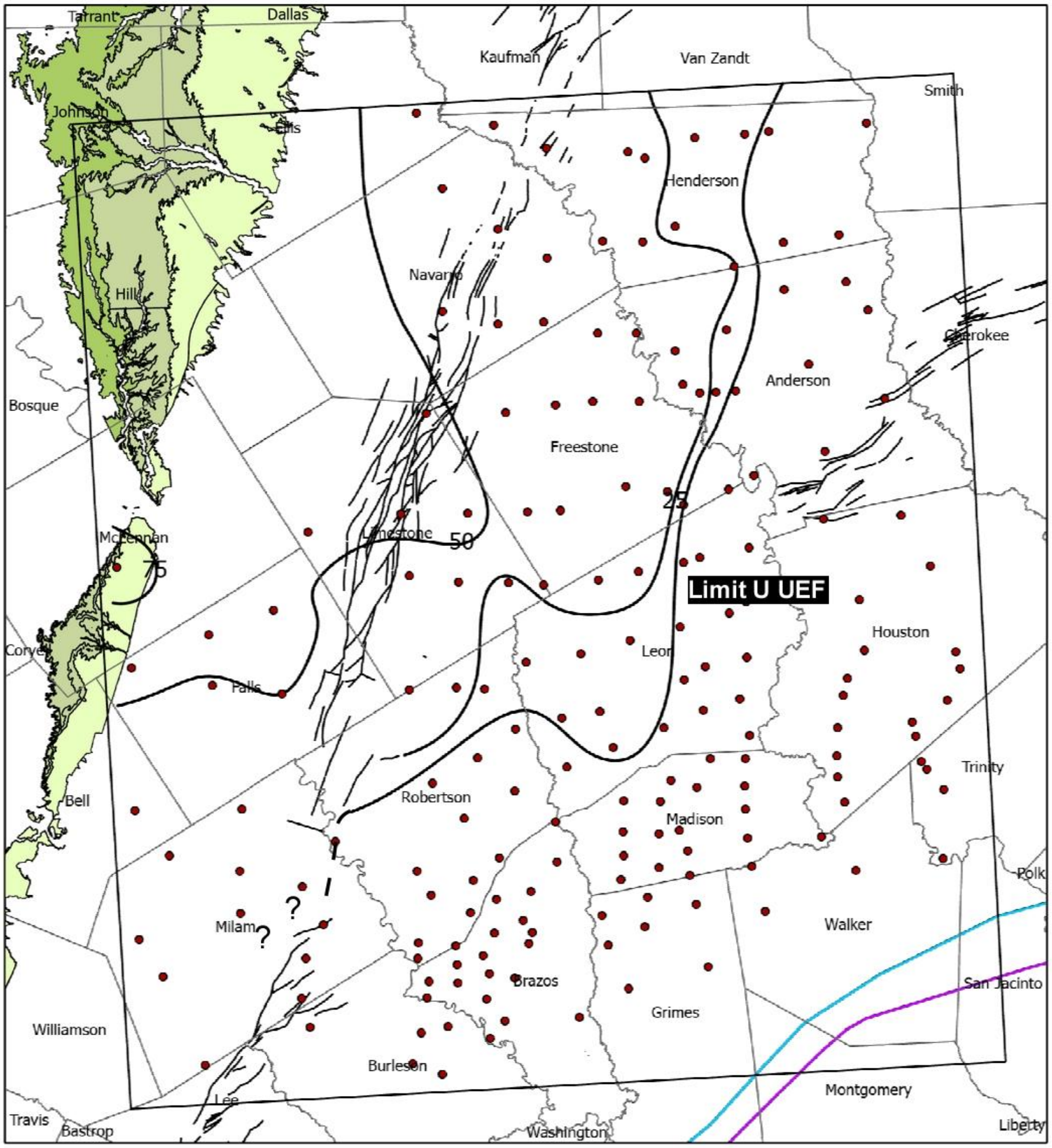


Buda Isopach



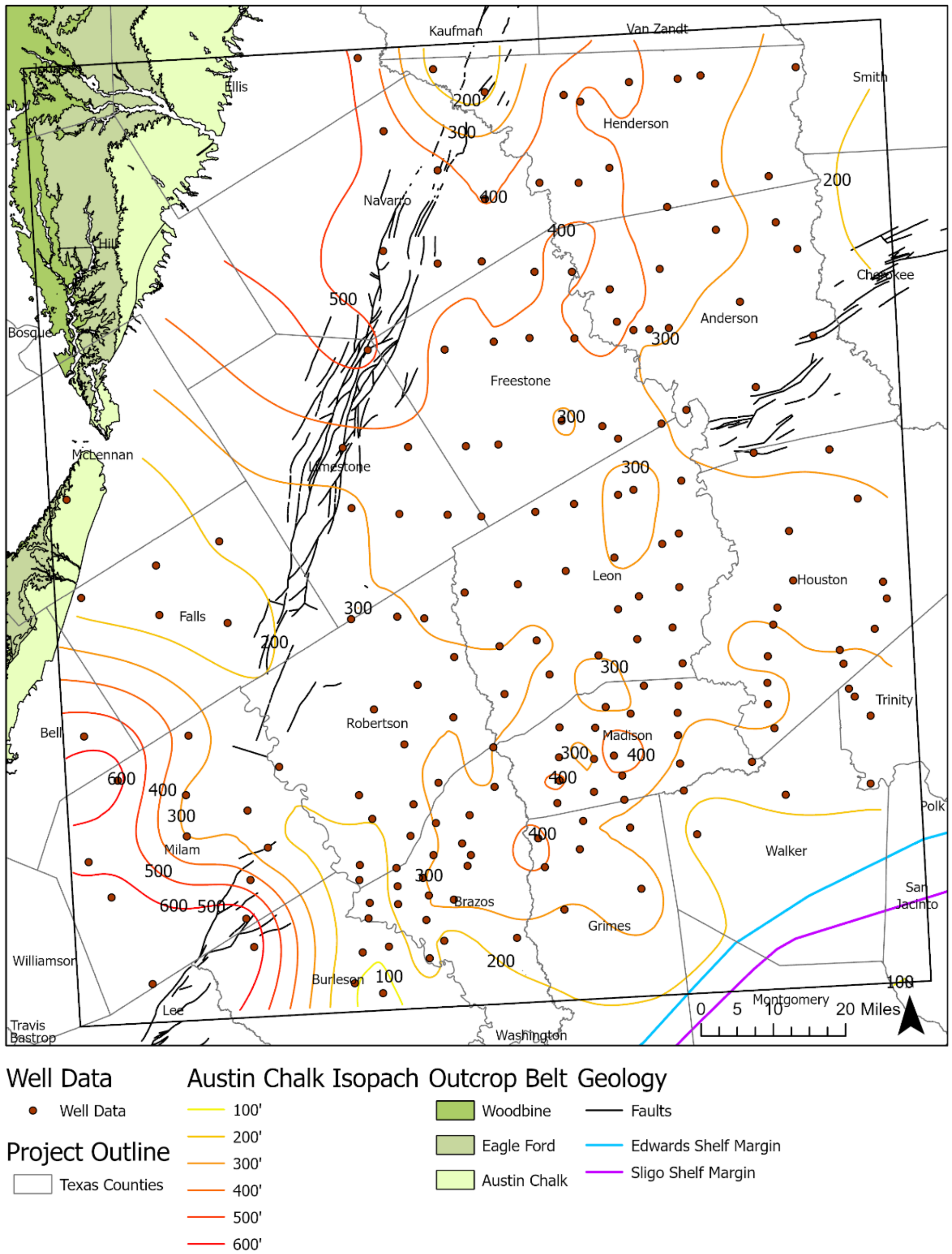


MM:UEF isopach map.

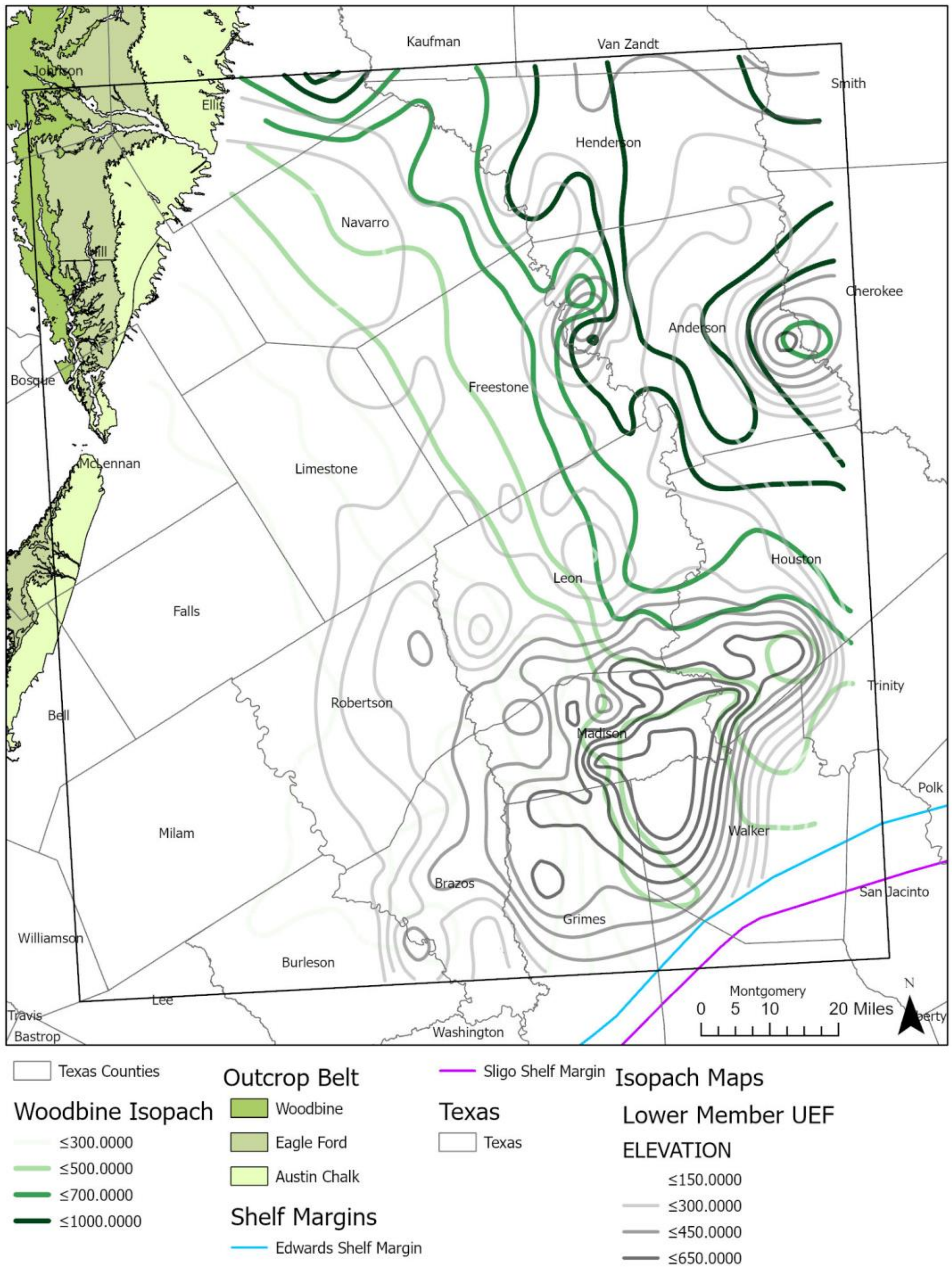


UM:UEF isopach map.

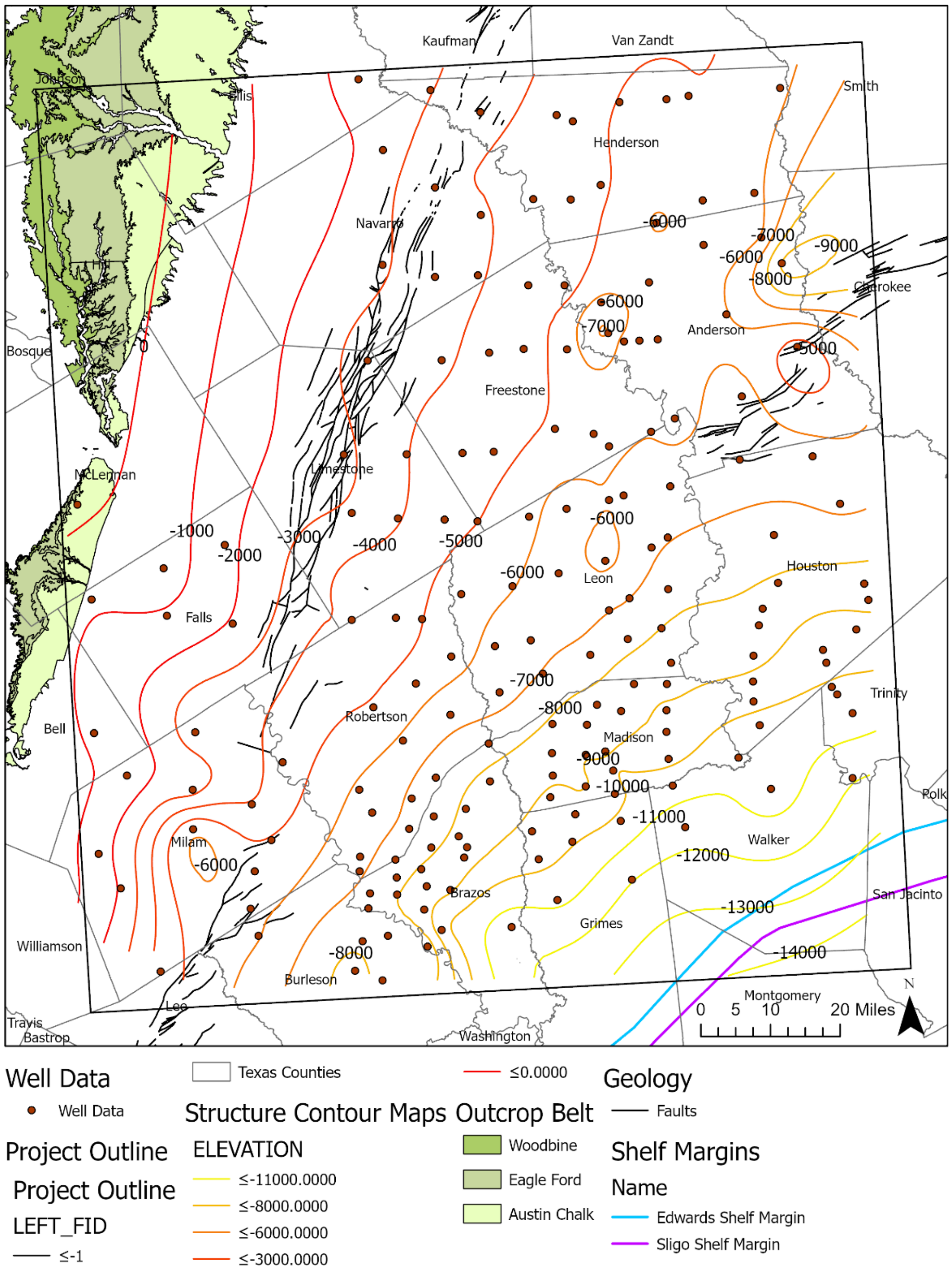
Austin Isopach



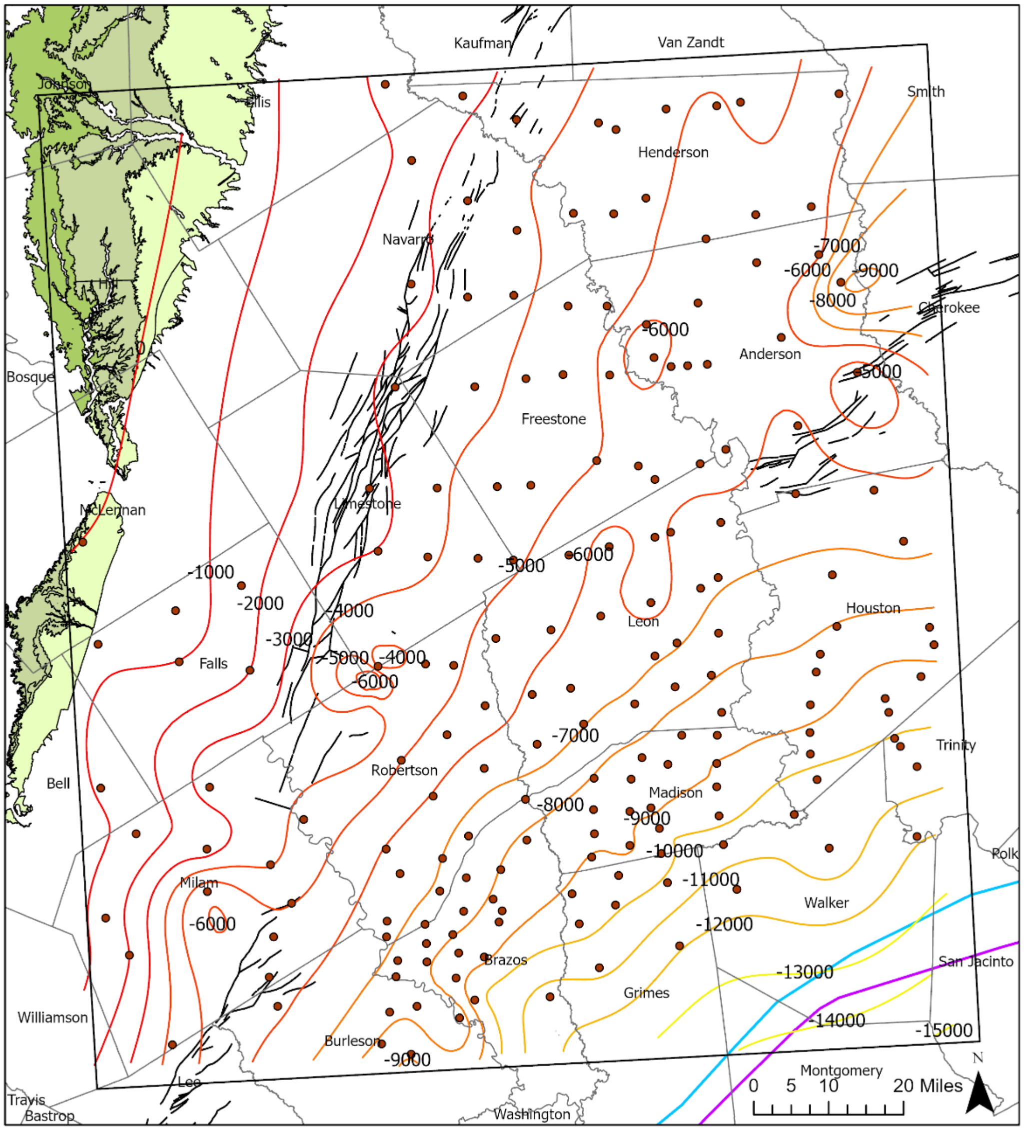
Woodbine Isopach



Georgetown Top



Buda Top



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Project Outline

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Outcrop Belt

Woodbine

Eagle Ford

Austin Chalk

Geology

Faults

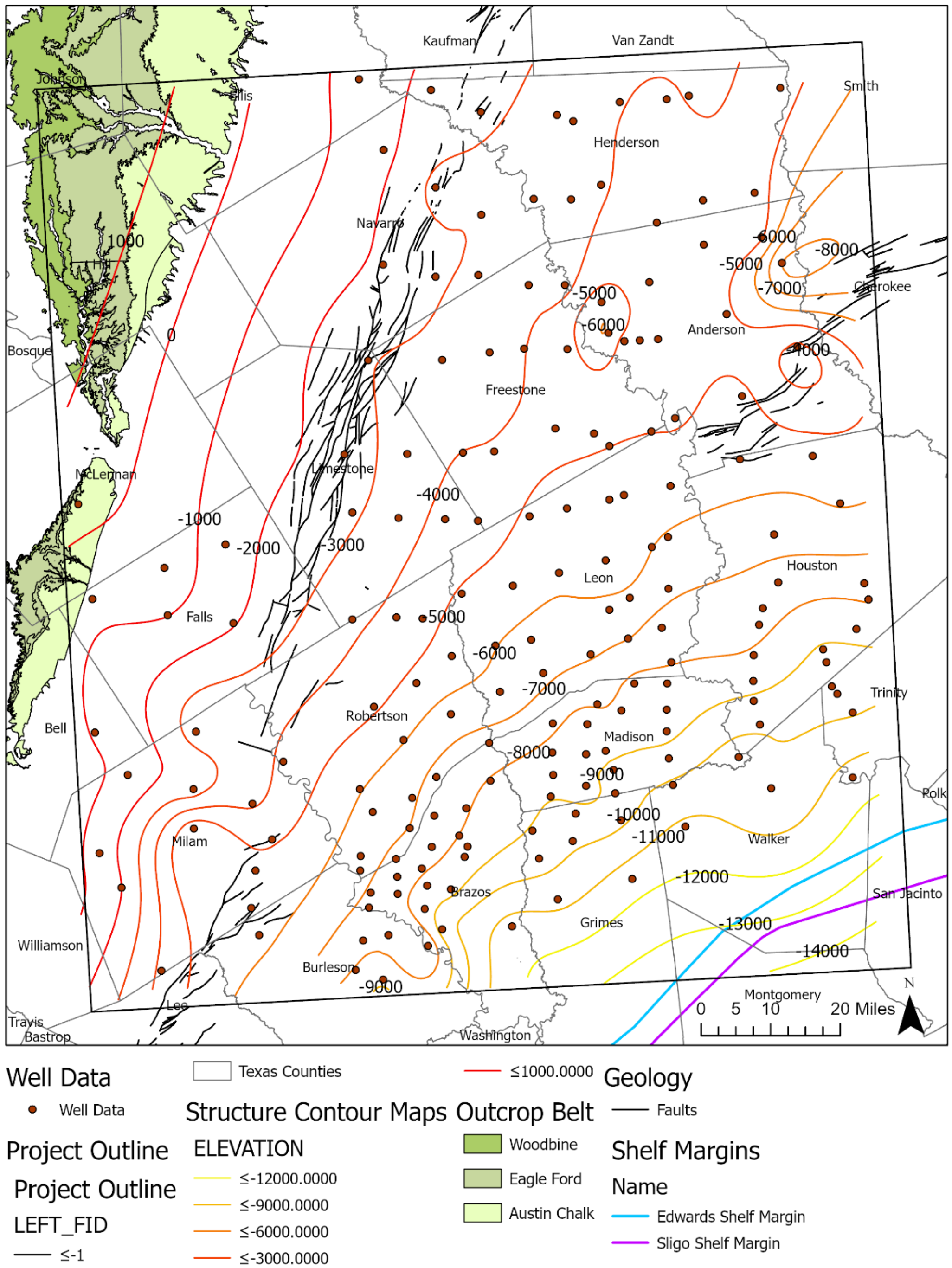
Shelf Margins

Name

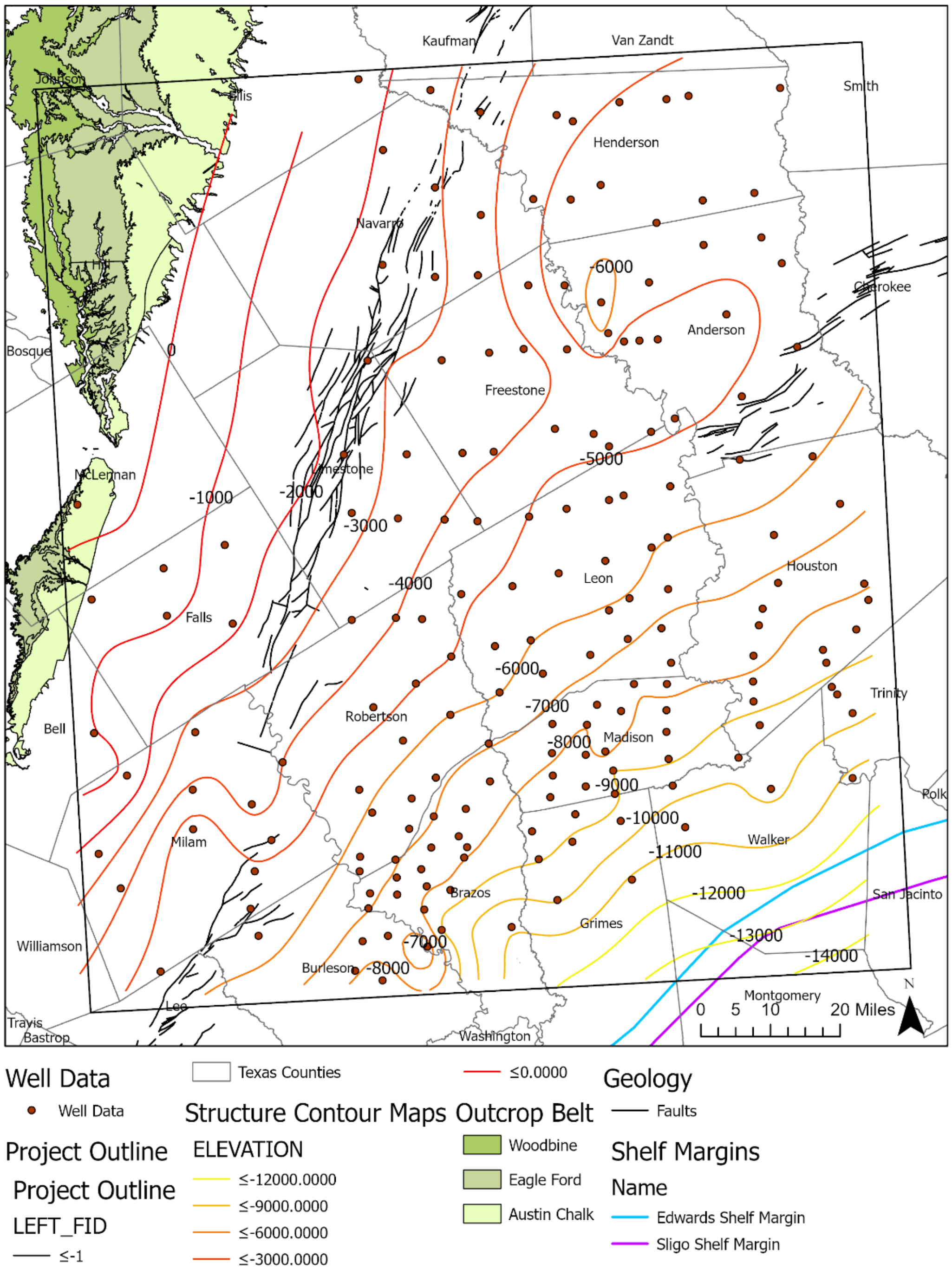
Edwards Shelf Margin

Sligo Shelf Margin

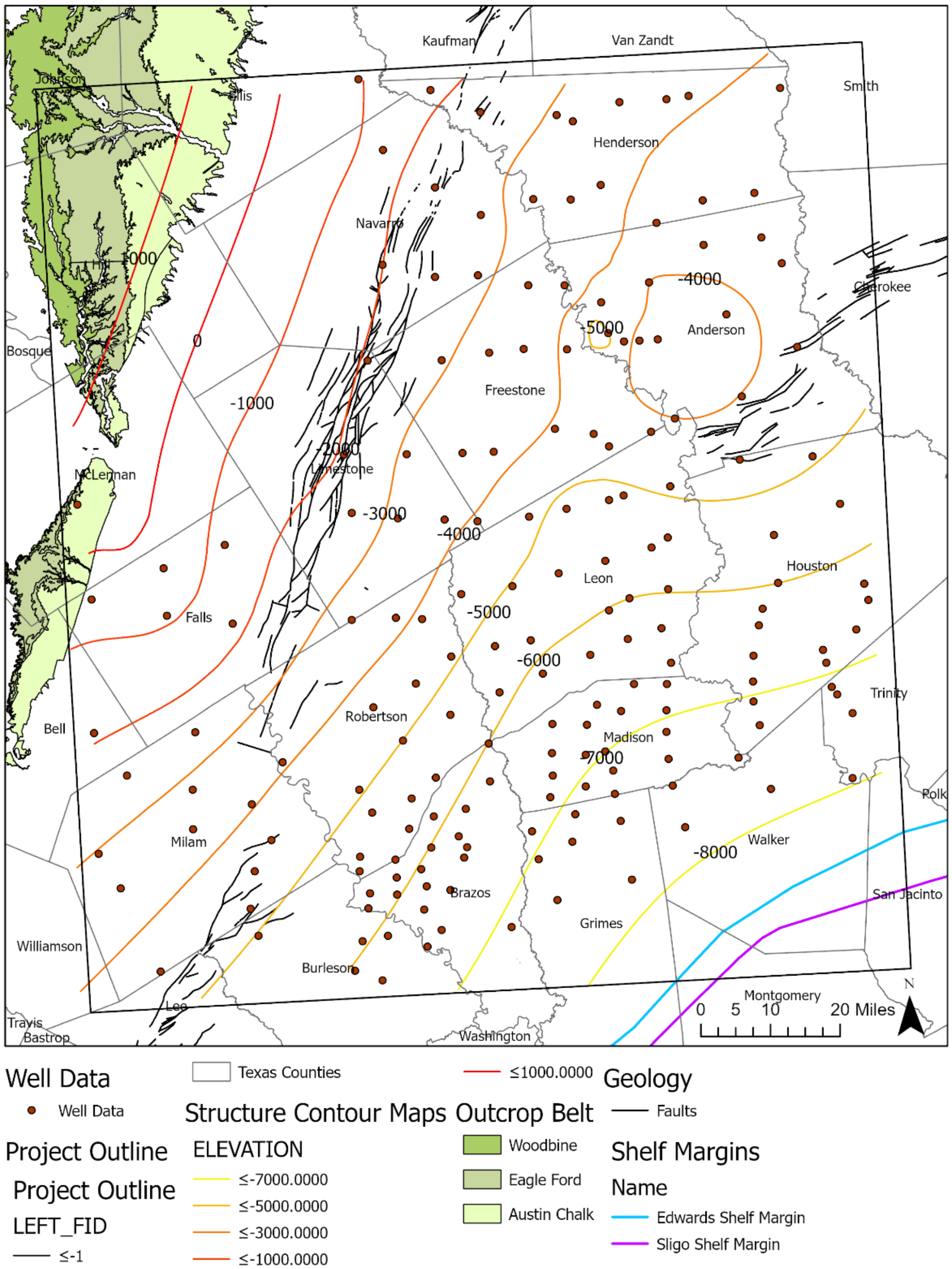
Woodbine top



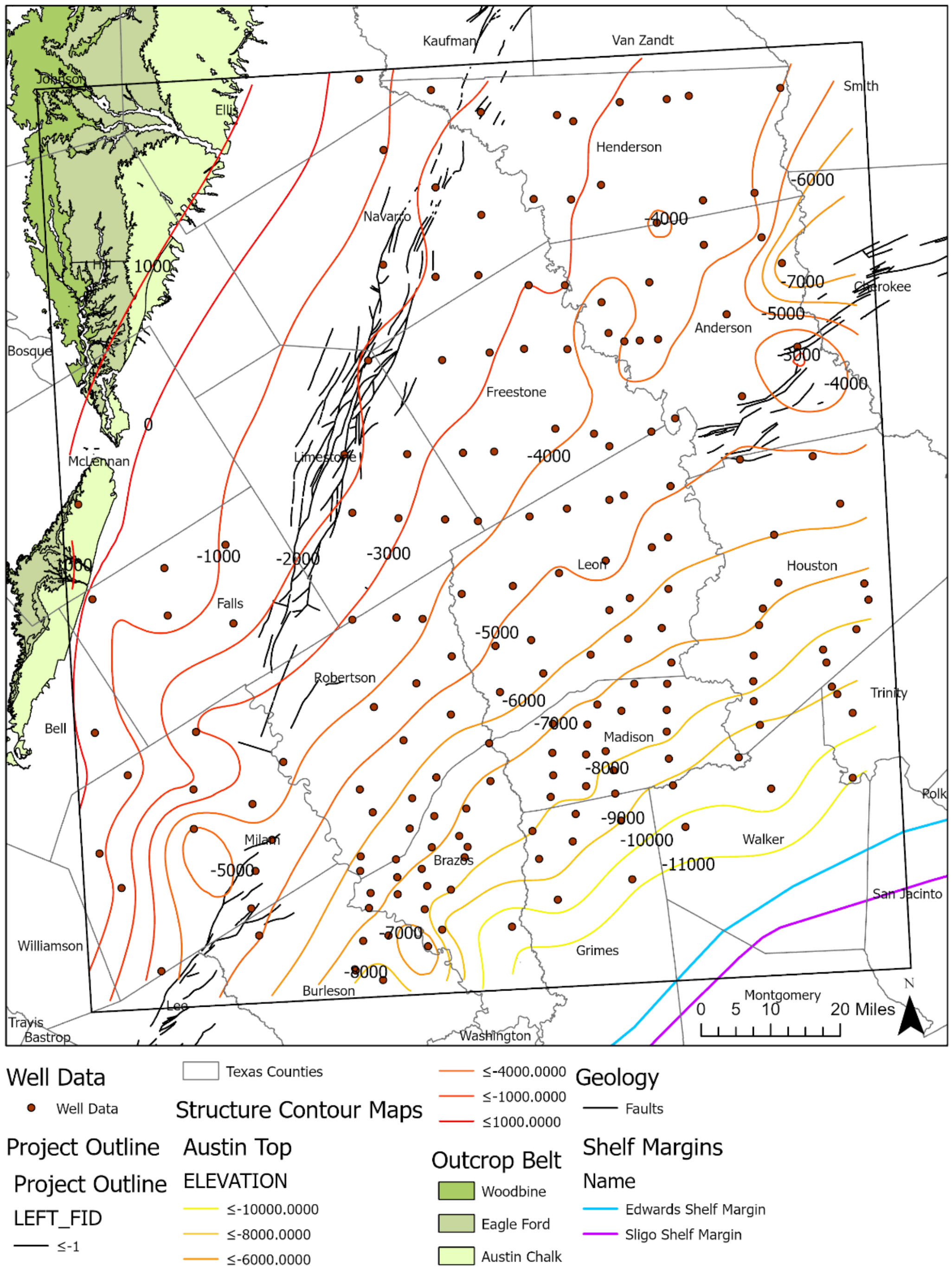
Harris Delta Top



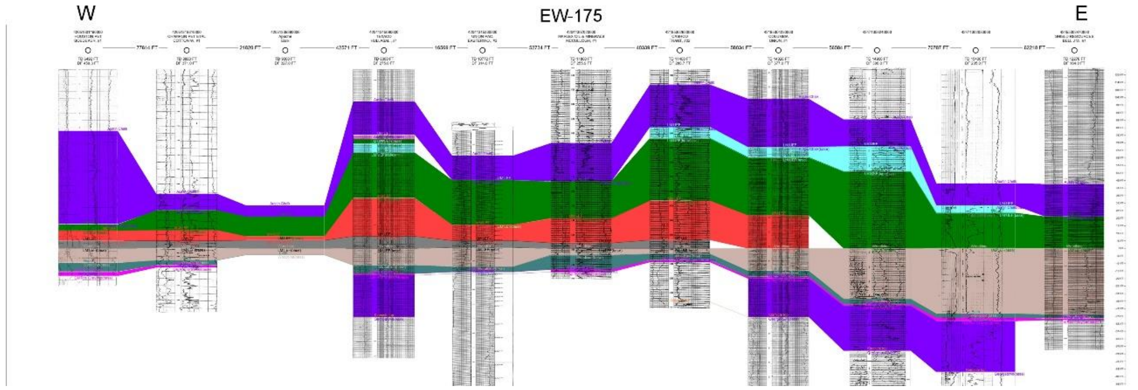
Upper Member UEF

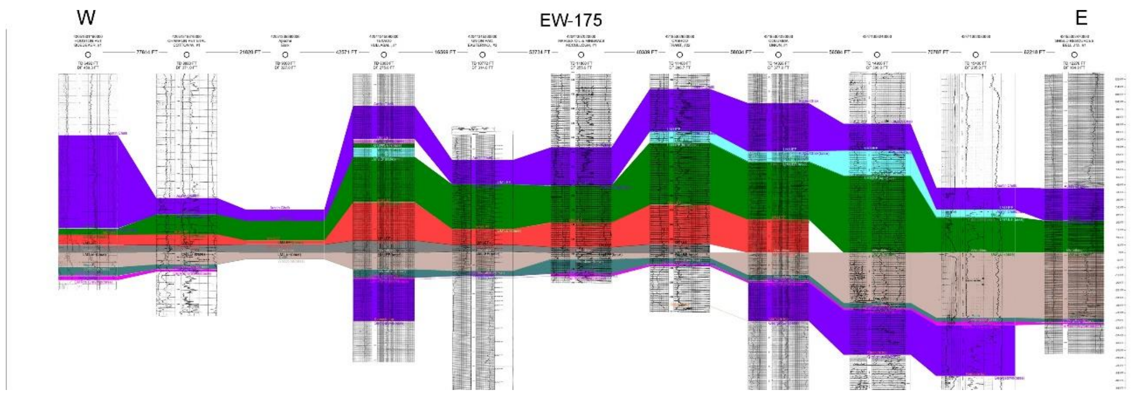


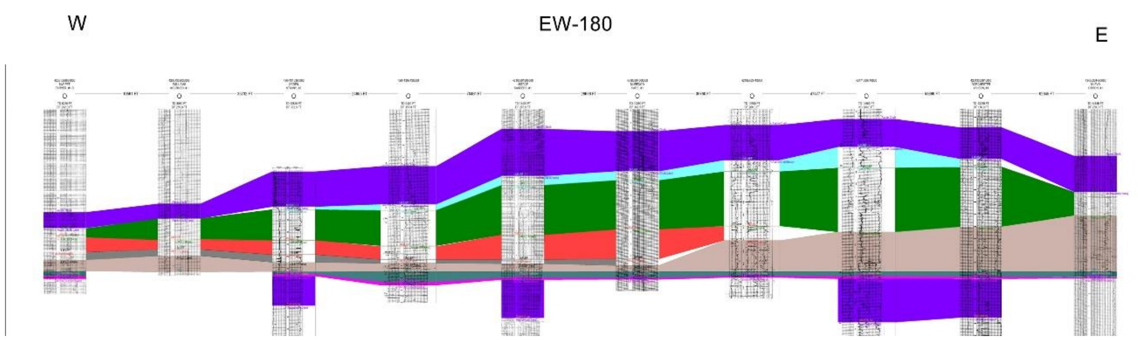
Austin Top



Kaufman
Van Zandt
Johnson
Ellis
Henderson
Smith
Navarro
Cherokee
Anderson
Bosque
Freestone
McLennan
Limestone
Leon
Houston
Falls
Robertson
Trinity
Bell
Madison
Polk
Milam
Brazos
Walker
San Jacinto
Williamson
Grimes
Burleson
Montgomery
Lee
Travis
Bastrop
Washington
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
-9000
-10000
-11000
-3000
0 5 10 20 Miles
N
Well Data
Well Data
Texas Counties
Structure Contour Maps
≤-4000.0000
≤-1000.0000
≤1000.0000
Geology
Faults
Project Outline
Project Outline
LEFT_FID
≤-1
Austin Top
ELEVATION
≤-10000.0000
≤-8000.0000
≤-6000.0000
Outcrop Belt
Woodbine
Eagle Ford
Austin Chalk
Shelf Margins
Name
Edwards Shelf Margin
Sligo Shelf Margin


W
EW-175
E


W
EW-175
E


W
EW-180
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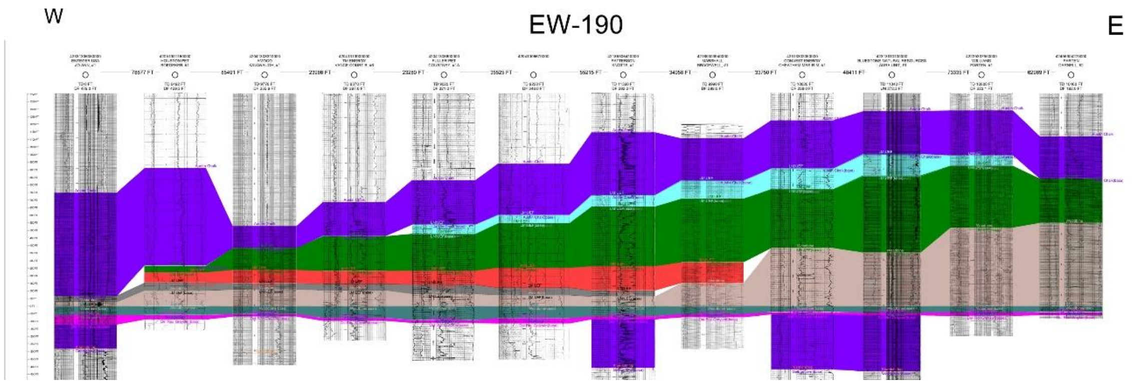
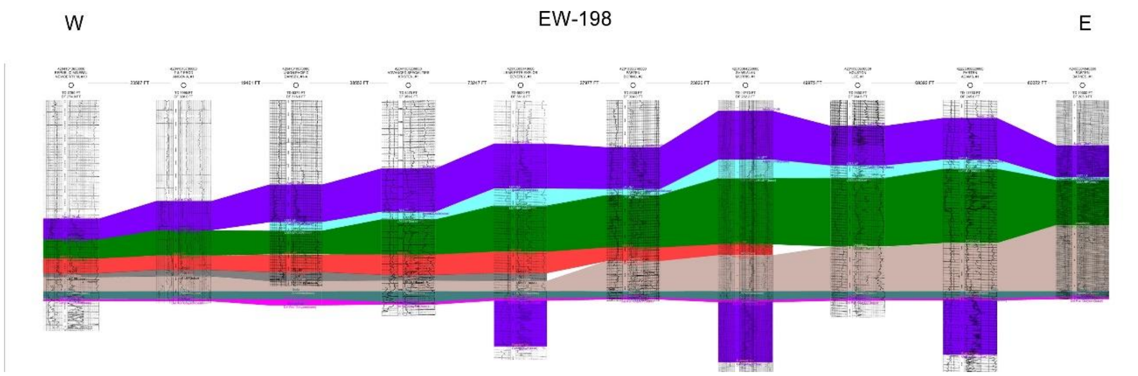
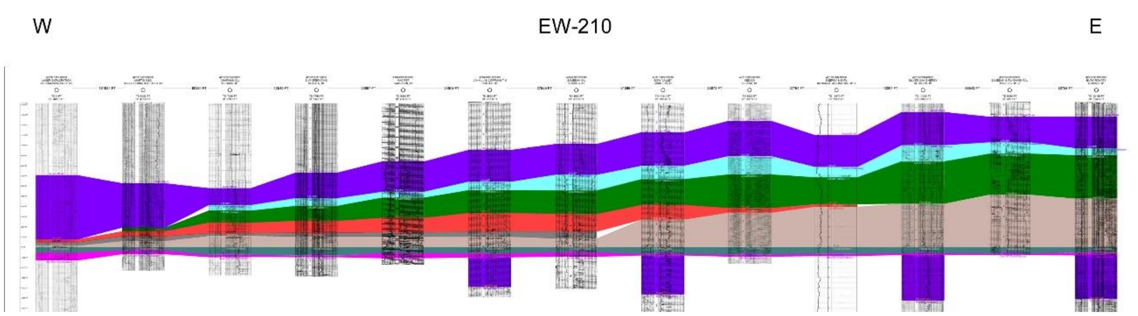

W
EW-190
E


W
EW-198
E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EW-210
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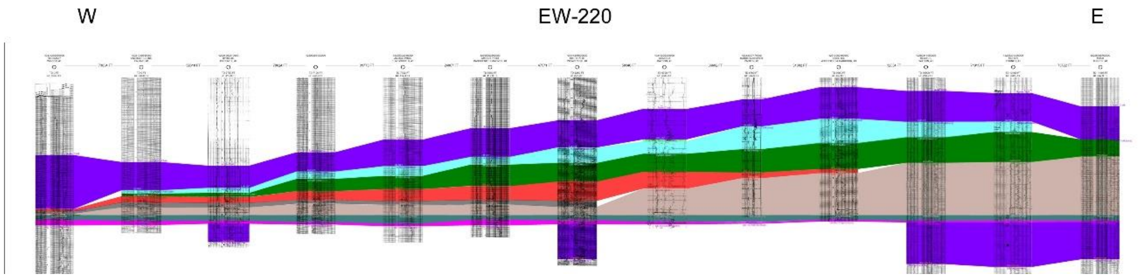
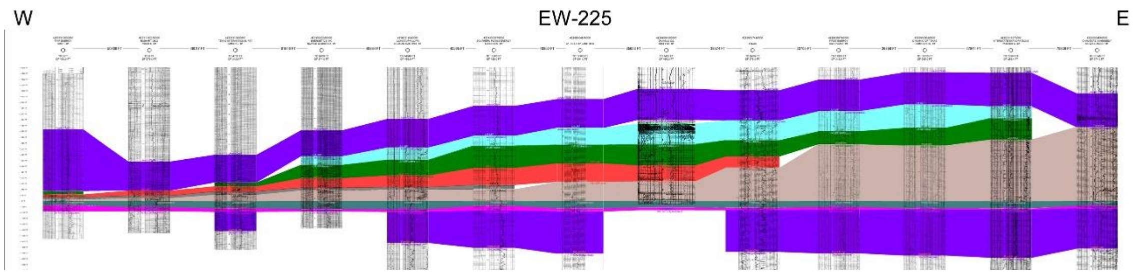

W
EW-220
E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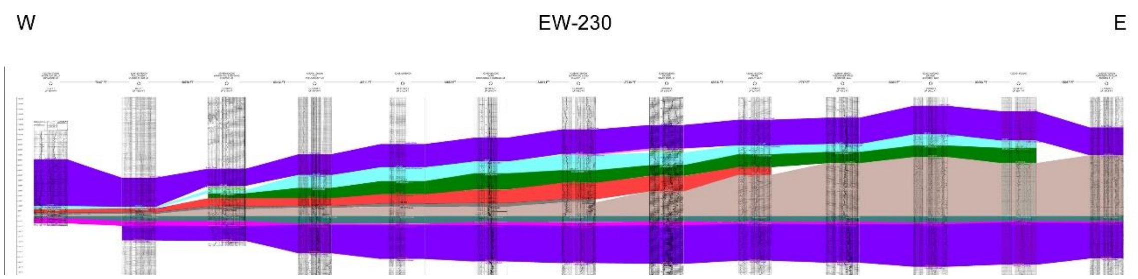
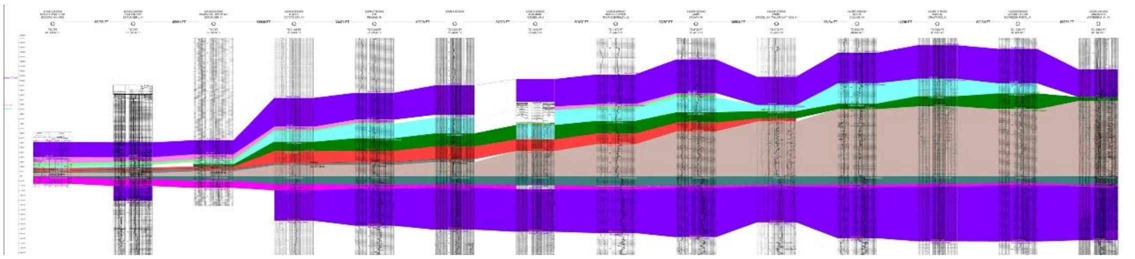
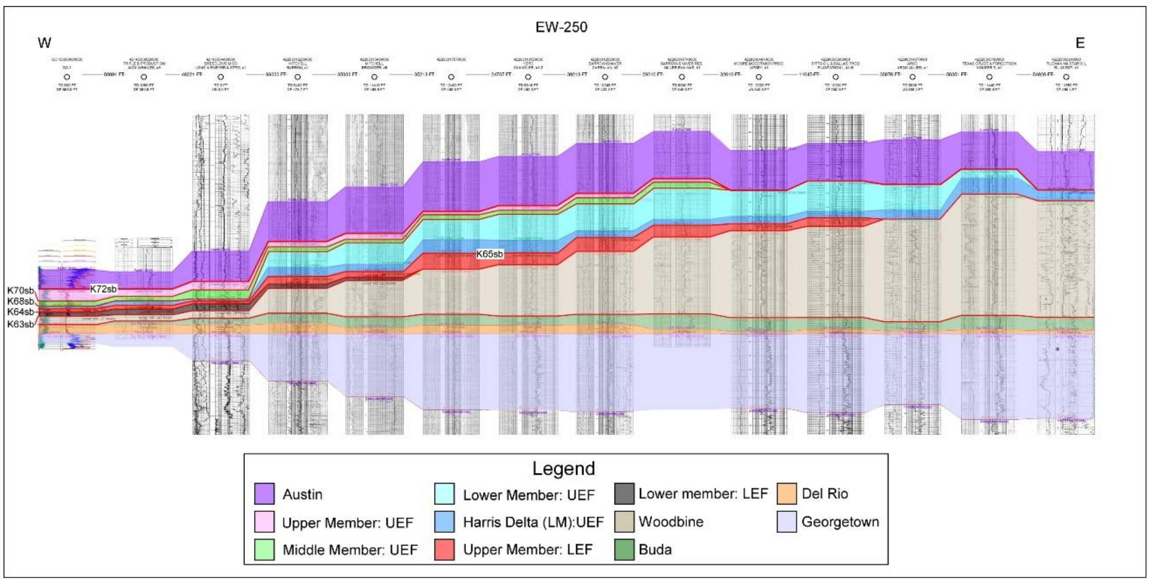
EW-225
E

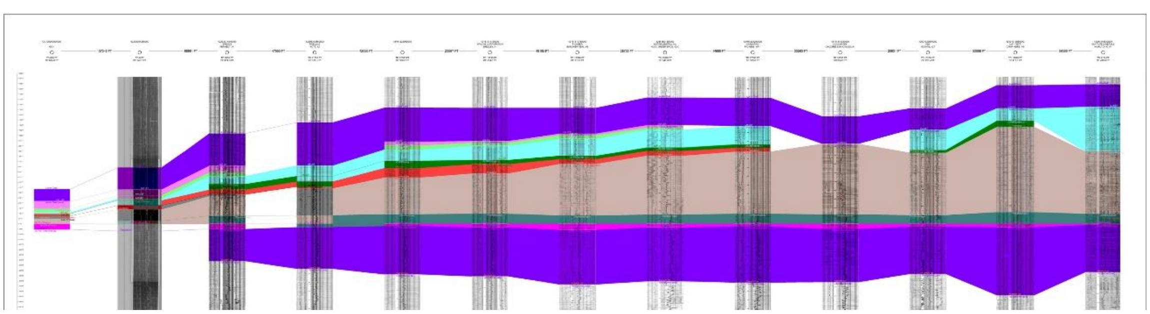

W
EW-230
E

W EW-240 E

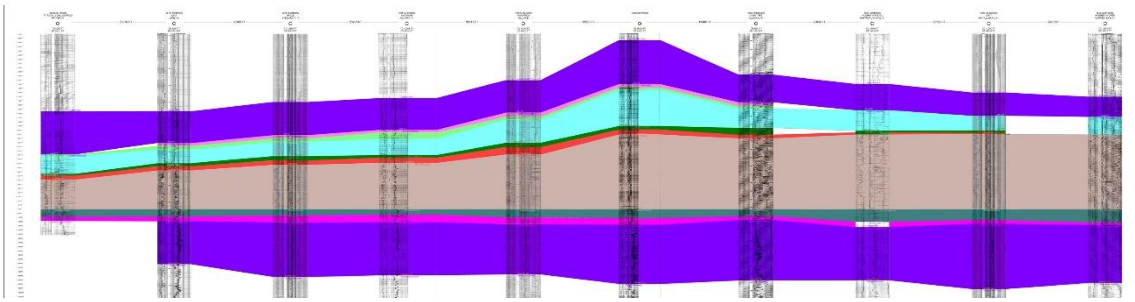




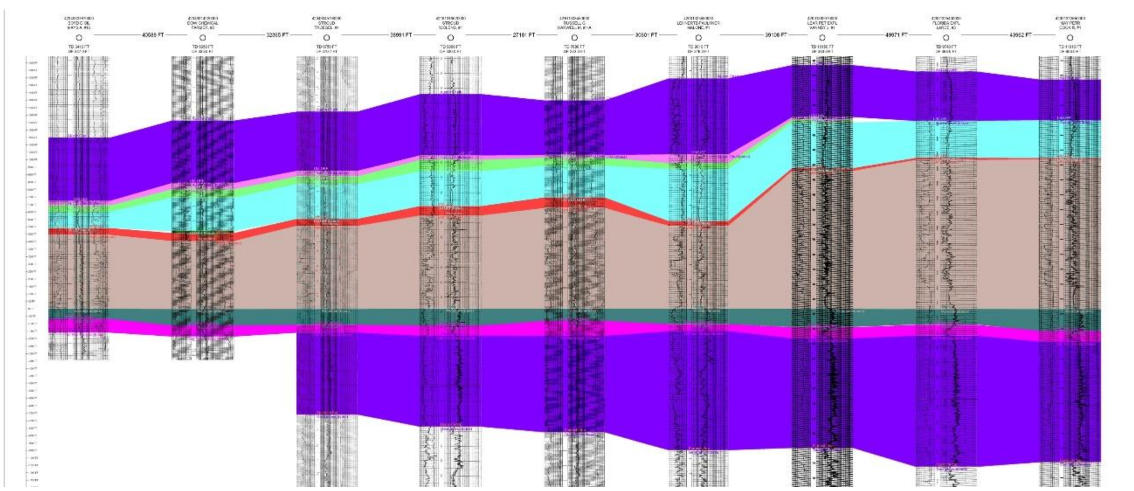
W EW-300 E



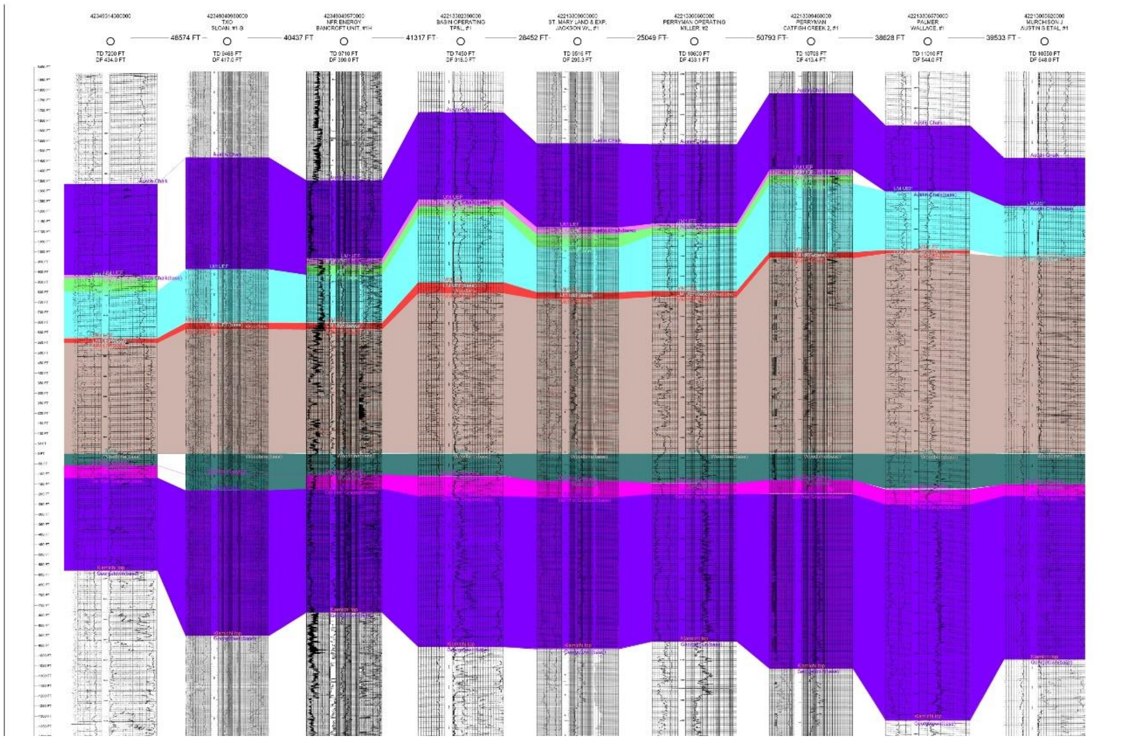
W EW-350 E



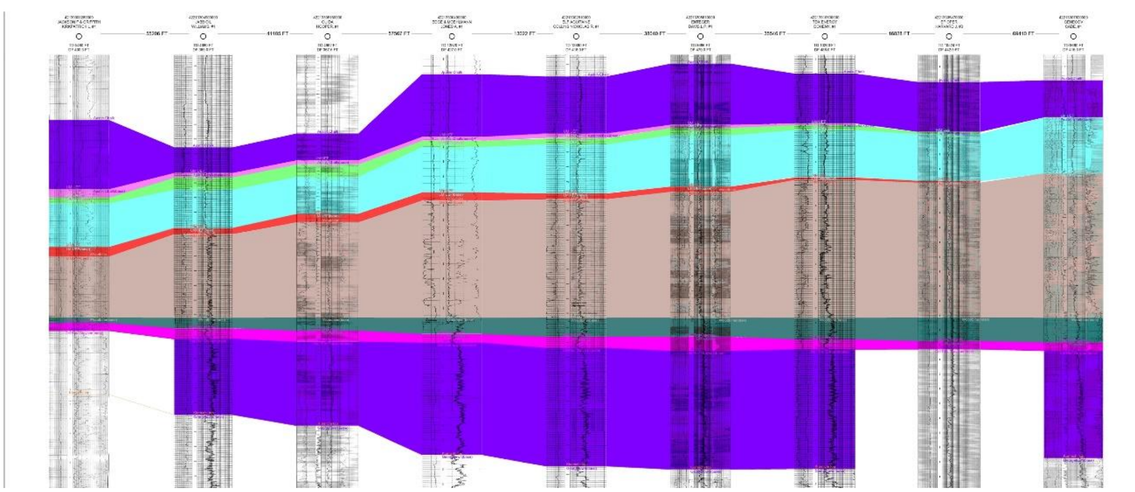
W EW-360 E



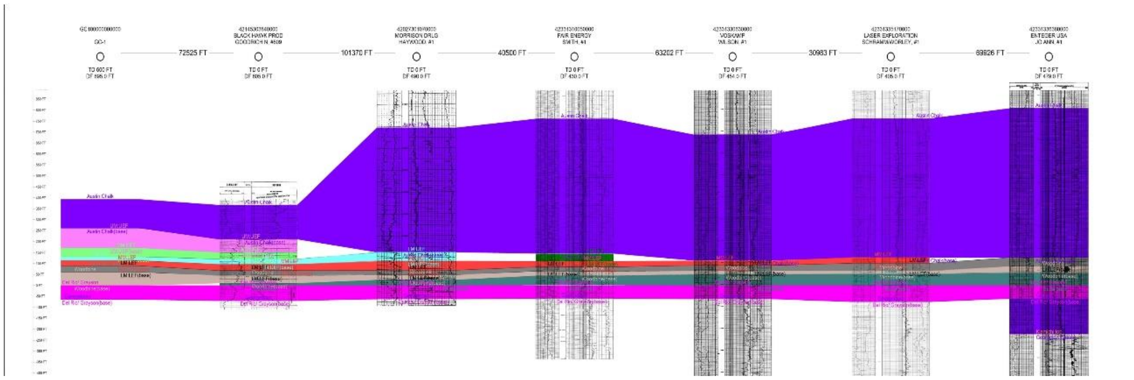
W EW-375 E



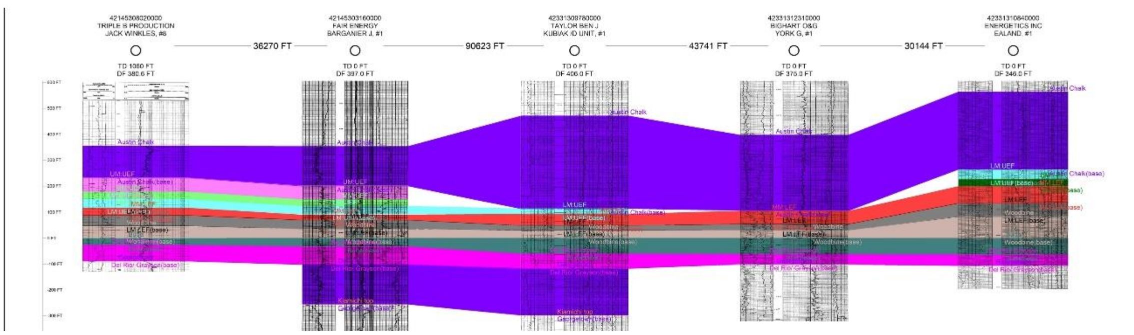
W EW-400 E



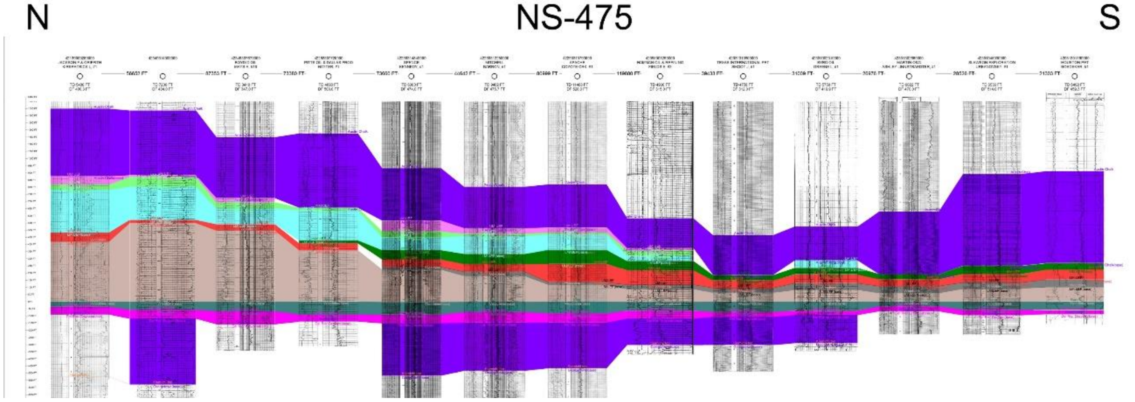
N NS-400 S

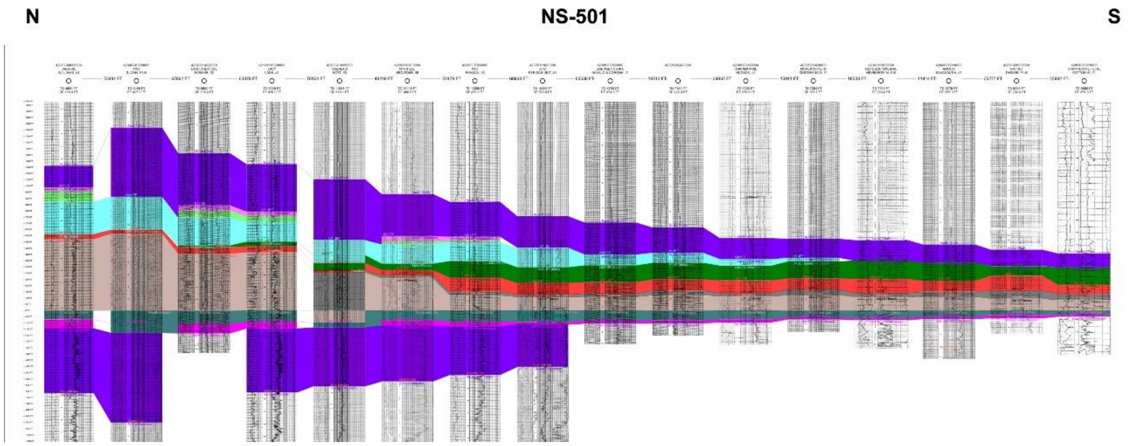


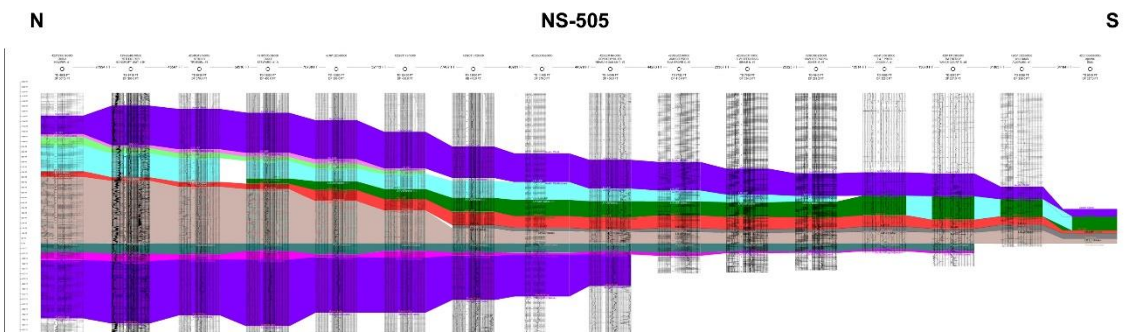
N NS-525 S



N NS-475 S




N
NS-501
S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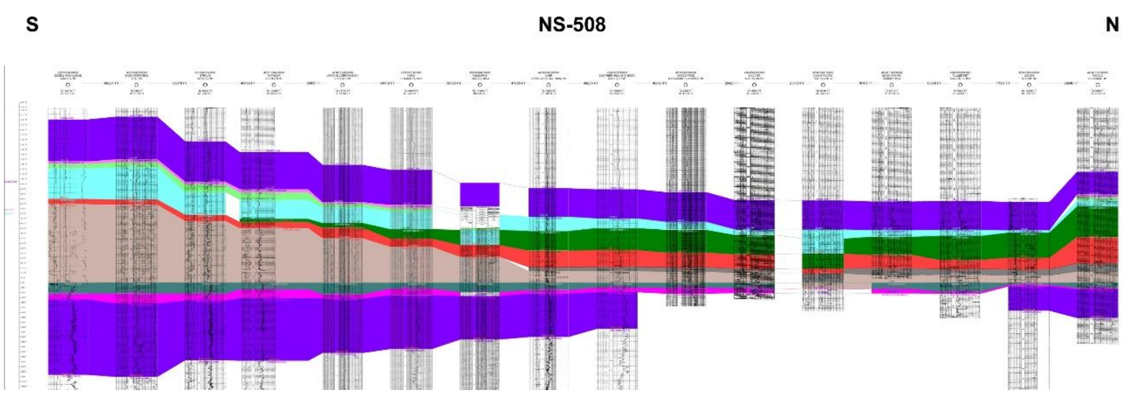
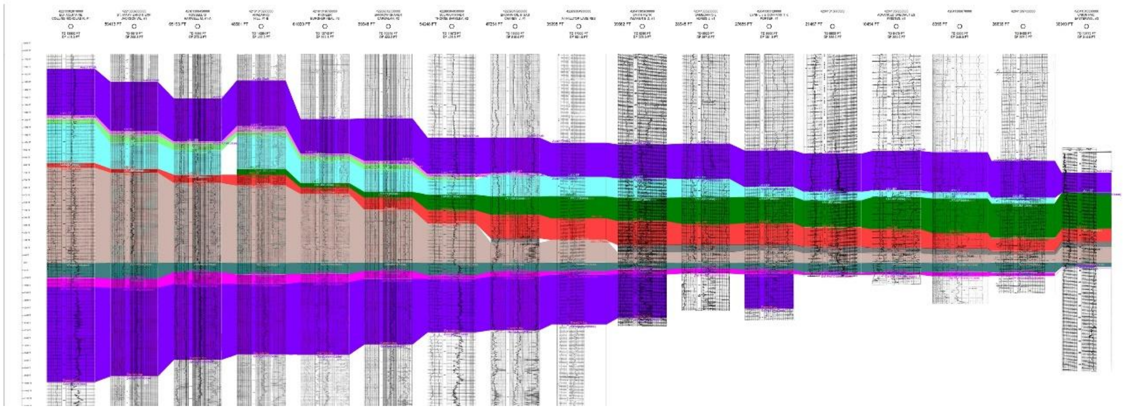
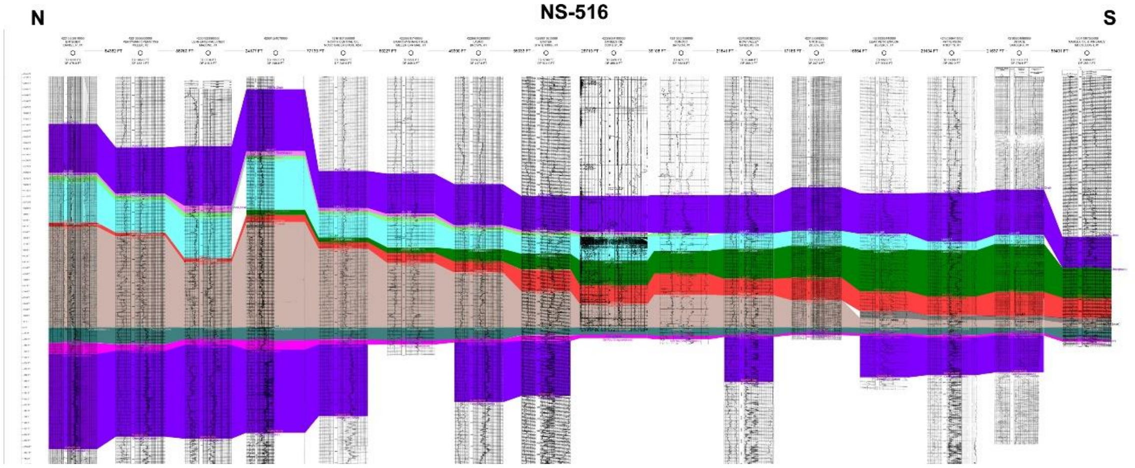
NS-505
S


S
NS-508
N

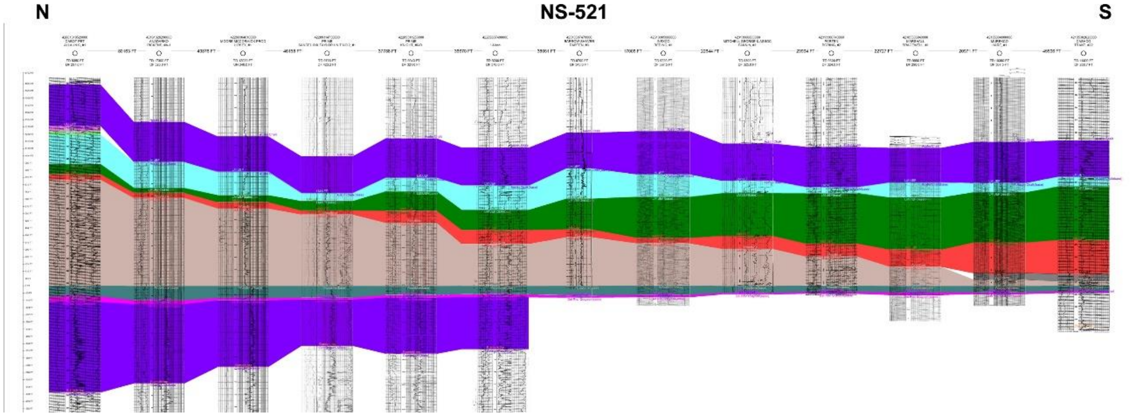
N NS-510 S



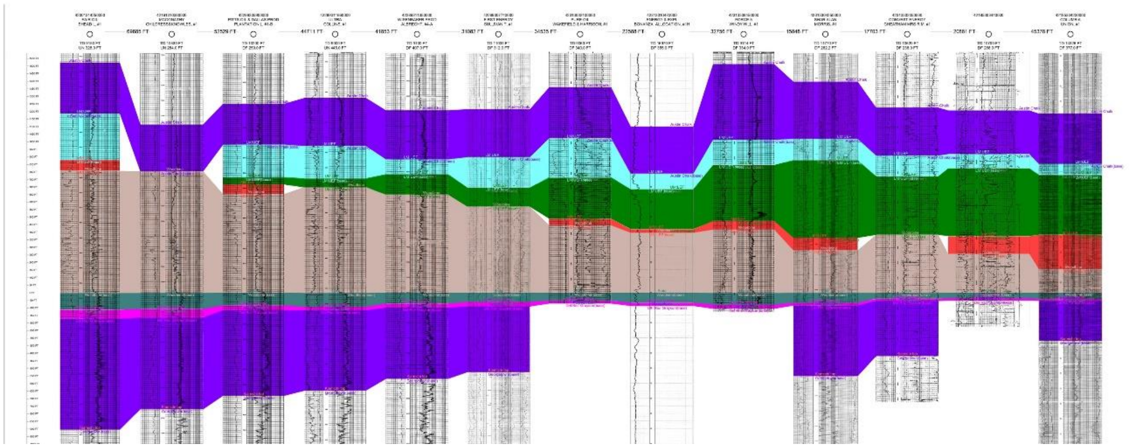
N NS-516 S



N NS-521 S



N NS-523 S



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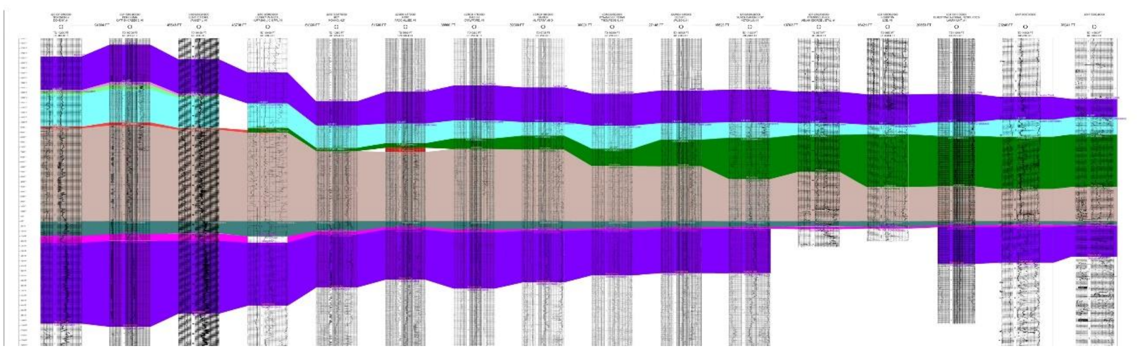
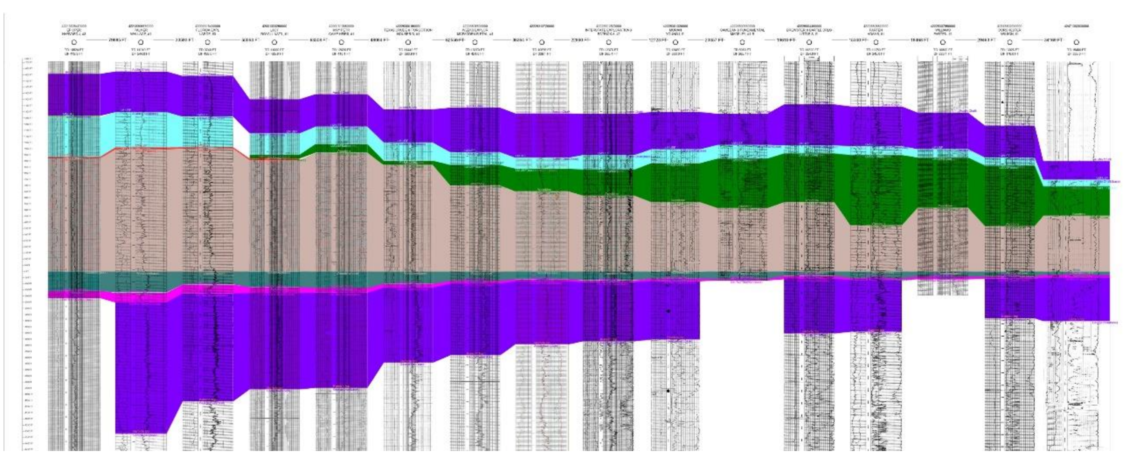
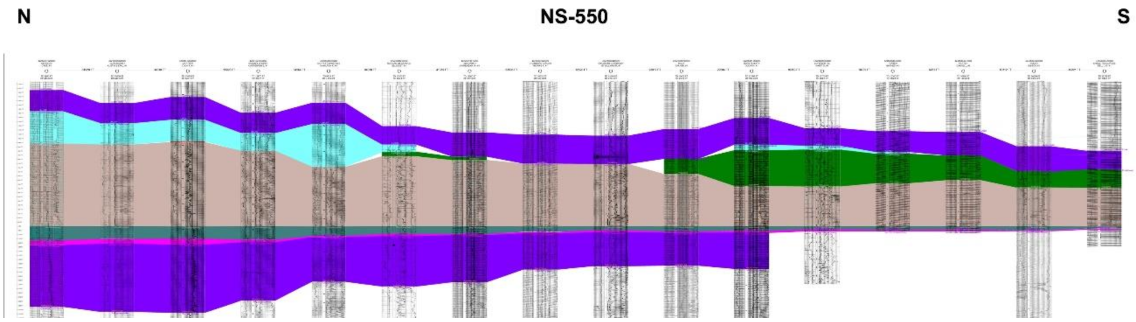


N NS-540 S




N
NS-550
S

	A	B	C	D	E
1	UWI	WellName	Lat Top Hole	Lon Top Hole	DatumType
2	42051318310000	COTTON W	30.506406	-96.586248	DF
3	42041315090000	HULLABAL.	30.55095	-96.41	DF
4	42041315330000	EASTERWO.	30.5849	-96.37472	DF
5	42041307020000	MCCULLOGH	30.58574	-96.2063	DF
6	42185302620000	TRANT	30.63843	-96.0929	DF
7	42185304230000	UNION	30.67481	-95.9123	DF
8	42471300240000		30.779311	-95.778229	DF
9	42471302030000		30.8516	-95.56783	DF
10	42455303470000	BELL J W	30.86683	-95.36935	DF
11	42051320830000	TARVER	30.56709	-96.56568	DF
12	42041315360000	STASNY	30.62851	-96.41464	DF
13	42041307430000		30.667191	-96.349931	DF
14	42185301980000	SANDERS	30.72515	-96.134956	DF
15	42185304000000	HARE	30.75845	-96.0518	DF
16	42185303410000		30.79826	-95.9333	DF
17	42471000740000		30.867835	-95.804677	KB
18	42313302910000	WILSON	30.919896	-95.642996	DF
19	42455304490000	GIBSON	31.00228	-95.36193	DF
20	42331336380000	JO ANN	30.517169	-97.054784	DF
21	42051301160000	BOEDEKER	30.585421	-96.816422	DF
22	42041313900000	VANCE COURT B	30.66189	-96.47948	DF
23	42041308800000	COURTNEY	30.67722	-96.40723	DF
24	42041306670000		30.733859	-96.314681	DF
25	42185306410000	KNOTTS	30.783611	-96.147778	DF
26	42185303940000	BRACEWELL	30.81552	-96.04223	DF
27	42313302050000	CHEATHAM MRS R M	30.854878	-95.944366	DF
28	42313310100000	LAURA UNIT	30.92321	-95.81127	UN
29	42225307950000	PARTEN	30.98556	-95.587689	DF
30	42455304270000	DARNELL	31.04267	-95.397	DF
31	42041313730000	ANGONIA	30.69782	-96.47872	DF
32	42041310970000	DANSBY	30.7131	-96.41908	DF
33	42041307230000	KRISTEN	30.755625	-96.306125	DF
34	42313303140000	BEVERLY	30.85279	-96.10076	DF
35	42313306740000	BORING	30.87325	-96.01438	DF
36	42313304250000	MORRIS	30.90351	-95.9467	DF
37	42313300630000	LOE	30.97997	-95.8136	DF
38	42225308820000	ADAMS	31.03513	-95.60052	DF
39	42455304040000	BARNES	31.05843	-95.40968	DF
40	42331345030000	URBANOVSKY	30.642268	-96.83282	DF
41	42395303420000	DESTEFANO S	30.713201	-96.567719	DF
42	42395303220000	JONES M	30.734961	-96.479979	DF
43	42041310100000	RUFFINO	30.7575	-96.39292	DF
44	42041310770000		30.778963	-96.325651	DF
45	42313306920000	ZULCH	30.89815	-96.09324	DF
46	42313000800000	FANNIN	30.939171	-96.011464	DF

	F	G	H	I
1	DatumElevation	County	Surf_Austin Chalk_TVDSS	Surf_Austin Chalk_TVDSS_BASE
2	371	Burleson	-7692.6	-7804.9
3	275	Brazos	-6272.1	-6500.4
4	314	Brazos	-8762.8	-8931.6
5	255.9	Brazos	-10604.9	-10866.6
6	288.7	Grimes	-9569.6	-9861.7
7	377	Grimes	-10703.8	-11037.1
8	306	Walker	-10277.7	-10463.6
9	235	Walker	-9604	-9756.6
10	164	Trinity	-10970.1	-11191.8
11	292	Burleson	-7282.4	-7411.3
12	332	Brazos	-7776.2	-8065.8
13	357	Brazos	-7915.5	-8229.5
14	278.9	Grimes	-8478.7	-8867.8
15	367.5	Grimes	-8703.6	-9033.3
16	288	Grimes	-8978.6	-9266.3
17	260	Walker	-9208.1	-9439.6
18	176	Madison	-9505.3	-9764
19	230	Trinity	-9431.4	-9728.9
20	479	Milam	-2981.4	-3663.2
21	459.3	Burleson	-4962.6	-5604.6
22	297	Brazos	-7158.7	-7380.8
23	321	Brazos	-7506.1	-7799.1
24	346	Brazos	-7561.7	-7901.2
25	292	Grimes	-7991.8	-8407.4
26	298	Grimes	-8300.4	-8579.6
27	238	Madison	-8434.9	-8750.8
28	272.3	Madison	-8445.4	-8732.1
29	223.1	Houston	-9086.7	-9382.8
30	192	Trinity	-9062.4	-9339.7
31	328	Brazos	-6875.7	-7101.6
32	316	Brazos	-7132.8	-7425
33	351	Brazos	-7407.4	-7742.4
34	361	Madison	-7885.3	-8231.5
35	324	Madison	-7785.2	-8108.3
36	282.2	Madison	-8440.3	-8816.7
37	334.6	Madison	-7830.2	-8136.7
38	245	Houston	-8248.3	-8569.9
39	203	Trinity	-8908.7	-9154.3
40	514	Milam	-4899.3	-5540
41	265.7	Robertson	-6249.4	-6399.7
42	282.2	Robertson	-6657.2	-6876.3
43	384	Brazos	-6917.7	
44	385	Brazos	-7166.6	-7490.3
45	347	Madison	-7651.6	-8023.2
46	325	Madison	-7772	-8070

	J	K	L
1	Surf_UM:UEF_TVDSS	Surf_UM:UEF_TVDSS_BASE	Surf_MM:UEF_TVDSS
2			
3	-6504.1	-6529.5	-6530.7
4			
5			
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46			

	M	N	O
1	Surf_MM:UEF_TVDSS_BASE	Surf_LM:UEF_TVDSS	Surf_LM:UEF_TVDSS_BASE
2			
3	-6560.8	-6561.7	-6624.1
4			
5			
6		-9860.4	-9941.1
7		-11037.5	-11111.5
8		-10460.9	-10637.8
9		-9756.6	-9809.9
10			
11			
12		-8067.5	-8090.2
13		-8230.7	-8279.4
14		-8868.6	-8945.2
15		-9033.8	-9109
16		-9266.7	-9360.6
17		-9439.2	-9606.5
18		-9765.6	-9834.4
19			
20			
21			
22			
23		-7800.2	-7863
24		-7898.9	-7954.2
25		-8405.9	-8481.7
26		-8576.7	-8698.8
27		-8750.8	-8888.8
28		-8728.4	-8874.2
29		-9385.1	-9450.5
30			
31			
32		-7424	-7492.1
33		-7745.4	-7801.3
34		-8233.9	-8369.6
35		-8106.7	-8158.3
36		-8816.3	-8961.3
37		-8135.8	-8235
38		-8571.7	-8643.8
39		-9155	-9175.8
40			
41		-6400.8	-6430.5
42		-6877.5	-6932.9
43		-7214.5	
44		-7492.4	-7565.4
45		-8024.9	-8152.5
46		-8072.1	-8171.3

	P	Q	R
1	Surf_UM:LEF_TVDSS	Surf_UM:LEF_TVDSS_BASE	Surf_MM:LEF_TVDSS
2	-7805.7	-7943.2	-7942.3
3	-6623.2	-6935.4	-6938.3
4	-8931.7	-9238.3	-9239.4
5	-10868	-11126.1	-11121.5
6	-9938.3	-10369.2	-10369.2
7	-11107.6	-11506.5	-11507.8
8	-10634.8	-11165.9	
9	-9807	-10049.9	
10	-11193	-11411	
11	-7413.7	-7488.2	-7490.1
12	-8089.2	-8343.6	-8342.2
13	-8277.5	-8572.3	-8576.5
14	-8943.4	-9351.5	-9352.6
15	-9107.9	-9512.1	-9510.8
16	-9361.4	-9809.8	-9812.3
17	-9610.9	-10138.8	
18	-9829.9	-10323.6	
19	-9730.1	-9924.4	
20			
21	-5607.2	-5650.5	-5650
22	-7383.4	-7612.2	-7612.2
23	-7860.8	-8103.8	-8103.6
24	-7955.7	-8248.7	-8247.3
25	-8481.8	-8875.5	-8874.2
26	-8699	-9117.9	-9118.3
27	-8888.7	-9277.1	
28	-8868.8	-9379.2	
29	-9452.1	-9861.8	
30	-9340.9		
31	-7102.4	-7295.8	-7297
32	-7492.5	-7674.5	-7677
33	-7801.8	-8075.3	-8072.8
34	-8364	-8720.7	-8721.9
35	-8154.8	-8561.3	-8560.5
36	-8958.3	-9473.3	-9473.3
37	-8232.1	-8765	
38	-8641.7	-9215.8	
39	-9175.1	-9528.3	
40	-5542.4	-5597	-5596.8
41	-6430.3	-6564.7	-6565.3
42	-6932.4	-7087.5	-7086.9
43	-7306.4		-7458.5
44	-7564.5	-7795.3	-7795.8
45	-8148.3	-8422.8	-8423.4
46	-8170.8	-8515.7	-8512.7

	S	T	U
1	Surf_MM:LEF_TVDSS_BASE	Surf_LM:LEF_TVDSS	Surf_LM:LEF_TVDSS_BASE
2	-8017.6	-8016.6	-8065.9
3	-7201.2	-7200.4	-7284.5
4	-9349.9	-9349.1	-9396.6
5	-11292.8	-11294.1	-11332.4
6	-10640	-10641.2	-10699.6
7	-11734.9		
8			
9			
10			
11	-7610.1	-7610.8	-7676.7
12	-8462.5	-8461.8	-8526.6
13	-8685.3	-8685.8	-8715.7
14	-9557.4	-9557.6	-9591.1
15	-9757.5	-9756.6	-9810
16	-9928.6		
17			
18			
19			
20		-3662.1	-3703.2
21	-5718.8	-5720.4	-5771.7
22	-7699.1	-7699.7	-7741.2
23	-8197.5	-8195.7	-8257.9
24	-8381.6	-8380.2	-8429.1
25	-9035.3	-9036.9	-9074.9
26	-9255.4		
27			
28			
29			
30			
31	-7408.3	-7408.1	-7457.4
32	-7812.5	-7812.8	-7882.9
33	-8233.2	-8232.2	-8276.2
34	-8888.6	-8889.9	-8949.9
35	-8666.7		
36	-9556.7		
37			
38			
39			
40	-5656.3	-5656.4	-5700.8
41	-6655.5	-6655.7	-6702.6
42	-7201.6	-7200.7	-7240.8
43		-7608.1	
44	-7959.5	-7959.8	-8011.6
45	-8614.9		
46	-8617.9		

	V	W	X
1	Surf_Woodbine_TVDSS	Surf_Woodbine_TVDSS_BASE	Surf_Buda_TVDSS
2	-8068.5	-8151.7	-8150.7
3	-7283.3	-7399.5	-7400.1
4	-9402	-9529.1	-9528
5	-11330.6	-11379	-11375.7
6	-10698.2	-10736.7	-10736.3
7	-11734.9	-11888.8	-11890.5
8	-11166.2	-11515.5	-11513.6
9	-10051.8	-10500.7	-10502.1
10	-11413.1	-11871.8	-11868.5
11	-7676.8	-7768	-7770.1
12	-8528.4	-8601.6	-8600.1
13	-8715.4	-8782.4	-8783
14	-9590.4	-9654.9	-9654.6
15	-9808.8	-9860.4	-9859.3
16	-9930.2	-10184.2	-10185.4
17	-10137.1	-10464.6	-10465.4
18	-10323.1	-10693.2	-10693.1
19	-9926.1	-10383.9	-10385.1
20	-3703.6	-3732.3	-3730.1
21	-5772.1	-5872.1	-5873.8
22	-7740.5	-7847.8	-7845.7
23	-8258.2	-8338.3	-8338.2
24	-8429.7	-8503.2	-8501.8
25	-9075.5	-9138.6	-9139.3
26	-9256.6	-9411.3	-9408.3
27	-9277	-9660.8	-9660.2
28	-9379.1	-9732.5	-9732.2
29	-9860.4	-10380.7	-10379
30	-9635.1	-10182.2	-10183.4
31	-7458.3	-7573.3	-7573
32	-7881.9	-7961.2	-7960.4
33	-8274.8	-8358.7	-8359
34	-8948.6	-9029.9	-9028.6
35	-8664.8	-8896.7	-8900.6
36	-9556.3	-9837.1	-9836.6
37	-8767.5	-9112.5	-9112
38	-9216.3	-9589.9	-9590.4
39	-9526.8	-10038.4	-10038.8
40	-5700.1	-5791.7	-5790.8
41	-6701.9	-6825.9	-6824
42	-7240.2	-7346.6	-7345.2
43	-7662.3		-7755.6
44	-8010.7	-8098.2	-8095.4
45	-8613.8	-8846.1	-8846.6
46	-8618.8	-8915.8	-8914.4

	Y	Z	AA
1	Surf_Buda_TVDSS_BASE	Surf_Del Rio/ Grayson_TVDSS	Surf_Del Rio/ Grayson_TVDSS_BASE
2	-8183.8	-8185.7	-8199.6
3	-7457.5	-7457.8	-7468.3
4	-9563.7	-9565.1	
5	-11477	-11474.6	-11495.7
6	-10779.6	-10780.8	
7	-11930.4	-11931.8	-11942.5
8	-11551.7	-11552.5	-11563.4
9	-10530.7	-10529.9	-10553.6
10	-11893.5	-11896.4	-11908.1
11	-7805.5	-7807.8	-7830.9
12	-8621.6	-8622.5	-8637.5
13	-8869.1	-8869.6	-8896.6
14	-9705.3	-9705.2	-9722.8
15	-9911.7	-9912.3	-9925.8
16	-10221.7	-10220.9	-10236.3
17	-10504.6	-10504	-10525.9
18	-10736.5	-10736.1	-10753.2
19	-10430.5	-10432.4	-10443
20	-3791.5	-3790.1	-3850.7
21	-5931.7	-5935	-5961.8
22	-7922.8	-7924.1	-7941.2
23	-8430	-8431.2	-8448.7
24	-8582	-8582.5	-8615.7
25	-9204.9	-9206.6	-9225.7
26	-9461.7	-9460.8	-9481.7
27	-9698.3	-9700.7	-9714.2
28	-9775.9	-9775.8	-9793.4
29	-10421.1	-10420.3	-10443.2
30	-10223	-10225.5	-10243.9
31	-7634.5	-7634.5	-7649.9
32	-8025.4	-8022.9	-8068.7
33	-8440.7	-8441.1	-8460.7
34	-9082.8	-9082.2	-9100.7
35	-8949.6	-8950	-8963.8
36	-9902.5	-9901.2	-9920.8
37	-9168.8	-9169.4	-9185.4
38	-9646.1	-9645.1	
39	-10080.9	-10082.8	-10098
40	-5849.2	-5849.1	-5886.7
41	-6878	-6879.1	-6895.5
42	-7427.8	-7427.9	-7438.7
43		-7822.3	
44	-8177.8	-8179.9	-8196.2
45	-8894	-8891.4	-8912
46	-8972.1	-8971.7	-8982.9

	AB	AC	AD
1	Surf_Georgetown_TVDSS	Surf_Georgetown_TVDSS_BASE	Surf_Kiamichi top_TVDSS
2	-8198.7		
3	-7468.7	-7757.5	-7757.4
4	-9576.8		
5	-11493.6		
6	-10793.8		-11068.8
7	-11943.5	-12208.3	-12208.1
8	-11563.9	-11872.1	-11871.3
9	-10552.8	-10904.4	-10905.3
10	-11905.1		
11	-7831.4		
12	-8638.7	-8883.3	-8884.6
13	-8896.3		
14	-9722.8	-10037.8	-10039.2
15	-9924.4		
16	-10236		
17	-10522.1	-10885	-10882.9
18	-10754.2	-11074.4	-11072.2
19	-10439.8		
20	-3850.3	-4012.3	-4015.5
21	-5961.8		
22	-7942		
23	-8448.6		
24	-8614.3		
25	-9225.1	-9546.1	-9545.2
26	-9480.3		
27	-9713.7	-10078.3	-10076.5
28	-9791.3	-10160.9	-10163.1
29	-10441.7		
30	-10244.5		
31	-7649.5		
32	-8067.9		
33	-8460.7		
34	-9100.3	-9455.3	-9455
35	-8963.9		
36	-9920.8	-10387.5	-10386.5
37	-9182.1		
38	-9660.6	-10081.5	-10083.3
39	-10099.4		
40	-5886.8		
41	-6895.8		
42	-7439		
43	-7868.5		
44	-8195.7		
45	-8909.7		
46	-8980		

	A	B	C	D	E
1	UWI	WellName	Lat Top Hole	Lon Top Hole	DatumType
47	42313308450000	WINDY HILL	30.944423	-95.964169	DF
48	42313302330000	ABLAH GEORGE J ETAL	31.025095	-95.811986	DF
49	42225004490000	LITTLE S	31.0773	-95.59986	DF
50	42225005050000	HARTT D	31.10923	-95.42013	DF
51	42331302680000	ASHLEY LINNSTRAEDTER	30.720017	-96.820819	DF
52	42395303100000	SEALE N	30.797701	-96.444831	DF
53	42041309350000	HARRISON	30.82243	-96.3842	DF
54	42041303120000	PORTER	30.8355	-96.30592	DF
55	42041305230000	ADAMS J	30.89055	-96.244819	DF
56	42313303820000	SANDERS	30.94534	-96.0923	DF
57	42313305060000	REDING	31.00121	-96.005401	DF
58	42313310470000	BONANZA ALLOCATION	31.026701	-95.92146	DF
59	42313309440000	KETCHUM	31.07915	-95.807877	UN
60	42225300330000	MADELEY	31.131129	-95.59633	DF
61	42225311950000	GODWIN	31.137074	-95.427025	DF
62	42331335170000	SCHRAMM/WORLEY	30.69307	-97.144949	DF
63	42331330630000	WILSON	30.76613	-97.19591	DF
64	42331310840000	EALAND	30.811417	-96.965564	DF
65	42331002310000	GREENE L	30.784131	-96.777429	DF
66	42395302340000	ELM GROVE C	30.861542	-96.435883	DF
67	42395302890000	MARGUERITE HANOVER	30.903009	-96.3758	DF
68	42041305630000	WEAVER B D	30.97013	-96.24493	DF
69	42313305390000	BATSON	31.005311	-96.088771	DF
70	42313307470000	PARTEN	31.04223	-95.97922	DF
71	42313002100000	WAKEFIELD & HARRISON	31.081911	-95.88827	DF
72	42289311480000	WILSON	31.12367	-95.79582	DF
73	42225301320000	YOUNG I	31.19407	-95.57992	DF
74	42225308760000	TURNER	31.17651	-95.3439	DF
75	42331310050000	SMITH	30.92799	-97.12228	DF
76	42331312310000	YORK G	30.894288	-96.964416	DF
77	42331310900000	SMOOT J	30.8601	-96.82249	DF
78	42395314640000	REAGAN GAS UNIT	30.982521	-96.451515	DF
79	42395302710000	MISCHSER	31.03275	-96.33523	DF
80	42289304930000	A1-HILLTOP LAKE RES	31.075949	-96.214219	DF
81	42289004100000	COX EST	31.111601	-96.107697	DF
82	42289307490000	1-Nash	31.146329	-95.991319	DF
83	42289307740000	SULLIVAN T	31.1764	-95.89914	DF
84	42289309520000	THOMPSON N	31.19628	-95.81601	DF
85	42225312570000	PATRICK A	31.227654	-95.568485	DF
86	42225004840000	MCWILLIAMS R	31.23637	-95.31209	DF
87	42027301070000	HAYWOOD	31.0183	-97.198246	DF
88	42331309780000	KUBIAK /D UNIT	31.014222	-96.954144	DF
89	42395001290000	FIELDS E	30.945815	-96.745123	DF
90	42395309580000		31.100606	-96.415683	DF
91	42395304830000	UPR/T-BAR-X LIGHTNING	31.154203	-96.327914	DF

	F	G	H	I
1	DatumElevation	County	Surf_Austin Chalk_TVDSS	Surf_Austin Chalk_TVDSS_BASE
47	334	Madison	-7146.6	-7645
48	283	Madison	-7718.5	-8032.9
49	254	Houston	-7811.4	-8143.6
50	299	Houston	-8541.3	-8747.2
51	470	Milam	-4694.5	-5130.7
52	334.6	Robertson	-6398.8	-6652.1
53	406.8	Brazos	-6629.1	-6929.5
54	381	Brazos	-7073.4	-7384.1
55	367.5	Brazos	-7126.9	-7428.2
56	368	Madison	-7437.1	-7762.8
57	367.5	Madison	-7448.9	-7794.2
58	355	Madison	-7446.3	-7756.7
59	298.6	Madison	-7344.8	-7671.7
60	265.7	Houston	-7354.7	-7608.6
61	324.8	Houston	-8283.6	-8596.8
62	405	Milam	-884.1	-1517.5
63	454	Milam	-360.6	-934.3
64	346	Milam	-4699.8	-5000.1
65	419.9	Milam	-4459.8	-4697.1
66	413.4	Robertson	-6212.1	-6490.8
67	419.9	Robertson	-6402.2	-6706.6
68	276	Brazos	-6454	-6743.6
69	383.9	Madison	-6944.5	-7269.5
70	343	Madison	-7103.3	-7388.8
71	340	Madison	-7289.4	-7625.4
72	258	Leon	-7195.4	-7524.6
73	300	Houston	-7025.5	-7327.4
74	232.9	Houston	-8147.6	-8499.2
75	430	Milam	-172.1	-786.2
76	375	Milam	-1799.5	-2090.8
77	312	Milam	-3489.7	-3767.5
78	456	Robertson	-5240.8	-5523.3
79	456	Robertson	-5595.6	-5893.7
80	501	Leon	-5526.2	-5815.3
81	456	Leon	-5834.7	-6146.1
82	378	Leon	-6121.6	-6423.8
83	312	Leon	-6328.7	-6644.6
84	280	Leon	-6625	-6946.2
85	285.4	Houston	-6933	-7268.2
86	274	Houston	-7593.1	-7932
87	490	Bell	84.6	-483.4
88	406	Milam	-2534.5	-2892
89	315	Robertson	-3691.5	-3900
90	370	Robertson	-4501	-4783.3
91	391	Robertson	-4561.6	-4853.3

	J	K	L
1	Surf_UM:UEF_TVDSS	Surf_UM:UEF_TVDSS_BASE	Surf_MM:UEF_TVDSS
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			-7270.2
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
80			
81	-6147.7	-6167.4	-6166.5
82			
83			
84			
85			
86			
87			
88			
89	-3900	-3916.3	-3917
90			
91			

	M	N	O
1	Surf_MM:UEF_TVDSS_BASE	Surf_LM:UEF_TVDSS	Surf_LM:UEF_TVDSS_BASE
47		-7644.6	-7809.6
48		-8035.4	-8151.7
49		-8144.2	-8209.6
50		-8746.7	-8796.7
51			
52		-6650.9	-6727.3
53		-6929.1	-6985.7
54		-7384.5	-7466.9
55		-7428.1	-7584.8
56		-7763.9	-7896.9
57		-7797.5	-7975.6
58		-7757.9	-7859.4
59		-7671.7	-7830.4
60		-7607.3	-7719
61		-8596.9	-8663.1
62			
63			
64		-4999.7	-5036.4
65		-4696.8	-4748
66		-6492	-6598
67		-6705.2	-6784.2
68		-6746.4	-6908.4
69	-7294	-7291.1	-7420.9
70		-7389.6	-7631.3
71		-7627.9	-7887.9
72		-7522.9	-7693
73		-7328.8	-7440.1
74			
75			
76			
77			
78		-5525.7	-5647.4
79		-5892.7	-5994.9
80		-5814.7	-5981.2
81	-6183.6	-6184.2	-6389.6
82		-6425.8	-6620.8
83		-6645	-6844.5
84		-6947.1	-7181.6
85		-7268.3	-7390.3
86			
87		-483.3	-525
88		-2891.2	-2912.4
89	-3954.6	-3955.8	-3991.3
90		-4785.7	-4955.9
91		-4852.4	-5000.4

	P	Q	R
1	Surf_UM:LEF_TVDSS	Surf_UM:LEF_TVDSS_BASE	Surf_MM:LEF_TVDSS
47	-7811.7	-8184.2	-8184.3
48	-8151.2	-8526.7	
49	-8208.9	-8608.3	
50	-8793.8	-9235	
51	-5129.8		-5166.8
52	-6726.3	-6872.1	-6871.9
53	-6987	-7182.7	-7182.1
54	-7468.9	-7691.6	-7690.3
55	-7582.4	-7813.2	-7811.6
56	-7895.3	-8150.6	-8150.6
57	-7974.6	-8304.2	-8305
58	-7860.4	-8125.2	-8126.9
59	-7827.5	-8246.3	
60	-7719.3	-8122.3	
61	-8664.3	-9092.3	
62			-1516.7
63			-936
64	-5036.4	-5064.1	-5064.1
65	-4750.1	-4793	-4795.3
66	-6596.7	-6736.7	-6738.3
67	-6787.9	-7015.9	-7018.3
68	-6907.4		-7108.4
69	-7422.5	-7613.6	-7613
70	-7632.9	-7878.3	-7879.1
71	-7884.2	-8159.2	-8161
72	-7690.8	-7961.3	
73	-7441.5	-7758.8	
74	-8498.8	-8680.9	
75	-787.8	-821.3	-821.7
76			-2092.1
77	-3768.7	-3806.2	-3806.1
78	-5645.5	-5803.3	-5804.4
79	-5989.9	-6213.7	-6212.3
80	-5979.3	-6168.6	-6167.6
81	-6385.8	-6597.8	-6598.9
82	-6620.9	-6782.5	-6783.2
83	-6846.4	-6973.8	
84	-7182.1	-7355.8	
85	-7387	-7600.3	
86			
87			-524
88			-2912.4
89	-3991.9	-4054.2	-4053.3
90	-4956.6	-5115	-5114.7
91	-4997.7	-5195.4	-5197.7

	S	T	U
1	Surf_MM:LEF_TVDSS_BASE	Surf_LM:LEF_TVDSS	Surf_LM:LEF_TVDSS_BASE
47	-8242.1		
48			
49			
50			
51	-5216.3	-5214.5	-5262.9
52	-6991.2	-6990.5	-7026.6
53	-7327	-7329.2	-7367.5
54	-7872.4	-7873.2	-7926.2
55	-7987	-7986.6	-8052.8
56	-8292.8		
57	-8349.6		
58	-8149.8		
59			
60			
61			
62	-1545	-1544.1	-1579.2
63	-957.7	-957.3	-982
64	-5129.5	-5128.7	-5179.9
65	-4854.6	-4856.1	-4902.1
66	-6863.3	-6863	-6900.8
67	-7165.8	-7165	-7212.9
68	-7311.6	-7311.1	-7372.8
69	-7793.6		
70	-7940.9		
71	-8205		
72			
73			
74			
75	-848.3	-847.9	-868.3
76	-2142.9	-2142.8	-2167.1
77	-3862.5	-3858	-3892.1
78	-5920.7	-5921.4	-5945.7
79	-6384.5	-6385	-6427.9
80	-6352.4		
81	-6757.8		
82	-6894.6		
83			
84			
85			
86			
87	-567.2	-566.7	-587.2
88	-2955.3	-2957.1	-2975.3
89	-4156.3	-4155.8	-4185.4
90	-5230.3	-5231.1	-5267
91	-5363.7	-5362.9	-5404.1

	V	W	X
1	Surf_Woodbine_TVDSS	Surf_Woodbine_TVDSS_BASE	Surf_Buda_TVDSS
47	-8240.5	-8659.6	-8658.4
48	-8526.5	-9027.5	-9026
49	-8608	-9169.9	-9170.6
50	-9235.4	-9705.9	-9707.2
51	-5262.1	-5322.5	-5323.4
52	-7026.9	-7133.7	-7132.2
53	-7369.2	-7474.1	-7473.2
54	-7926.5	-8028.7	-8028.2
55	-8054.2	-8143.2	-8141.2
56	-8292	-8565.3	-8565.6
57	-8349.2	-8687.5	-8689.9
58	-8149.2	-8546.7	-8546.7
59	-8245.3	-8674.6	-8673.1
60	-8123.8	-8639	-8637.8
61	-9091.7	-9570.1	-9569.3
62	-1578.8	-1593.6	-1592.5
63	-982.8	-998.6	-997.8
64	-5179.1	-5264.1	-5263.1
65	-4900.1	-4985	-4984.8
66	-6904	-7012.4	-7012.1
67	-7213	-7326.6	-7325.1
68	-7374.9	-7462.4	-7462
69	-7795.4	-8075.3	-8072.3
70	-7941.9	-8333.3	-8332
71	-8203.7	-8648.8	-8649.7
72	-7960.3	-8515.4	-8516.8
73	-7757.8	-8319.9	-8322.5
74	-8680.8	-9303.4	-9302.6
75	-869.2	-887.9	-888.1
76	-2166.8	-2196.6	-2196.8
77	-3892.1	-3955.4	-3954.5
78	-5947.4	-6059.9	-6061.5
79	-6428.6	-6547.5	-6546.8
80	-6354.9	-6546.1	-6546.4
81	-6759	-6958.2	-6957.5
82	-6896.3	-7232.5	-7231.1
83	-6974.6	-7542.5	-7543.4
84	-7356.3	-7915.4	-7913.8
85	-7599	-8220.7	-8216.4
86	-7930.3	-8670.5	-8671.6
87	-586.5	-609.7	-610
88	-2976.2	-3005.3	-3005.7
89	-4184.5	-4275.4	-4274
90	-5270.2	-5384.5	-5384.8
91	-5403.3	-5523.7	-5524.1

	Y	Z	AA
1	Surf_Buda_TVDSS_BASE	Surf_Del Rio/ Grayson_TVDSS	Surf_Del Rio/ Grayson_TVDSS_BASE
47	-8736.7	-8735.4	-8762.9
48	-9080	-9083	-9105.9
49	-9207	-9207.2	-9233.2
50	-9744.7	-9743.4	-9768.4
51	-5357.1	-5357.1	-5390.8
52	-7211.2	-7213.5	-7227.4
53	-7531.6	-7532.1	-7577.9
54	-8089.9	-8089.7	-8125.3
55	-8192.8	-8193.2	-8232.8
56	-8632	-8631.4	-8645.3
57	-8762.1	-8762.5	-8780.4
58	-8612.9	-8612.8	-8632.9
59	-8732.1	-8731.5	-8747.1
60	-8699	-8699.2	-8711.5
61	-9621.8	-9623.3	-9648
62	-1646.6	-1645.5	-1720.7
63	-1050.3	-1049.1	-1111.1
64	-5327	-5326.1	-5369.9
65	-5047.9	-5049.8	-5079.2
66	-7106.2	-7104.4	-7133.3
67	-7377	-7377.9	-7436.6
68	-7519.1	-7520.2	-7562
69	-8144	-8145.4	-8173.6
70	-8407.5	-8410	-8426.3
71	-8700.8	-8702	-8720
72	-8580.4	-8579.7	-8597.1
73	-8382.4	-8382.8	-8401.1
74	-9365.1	-9364.9	-9380.1
75	-930.8	-932.5	-992.1
76	-2259.1	-2258.8	-2297.5
77	-4028.8	-4029.1	-4062.5
78	-6144.1	-6142.7	-6168.2
79	-6596.6	-6596.5	-6642.9
80	-6620.7	-6621	-6649.5
81	-7021.5	-7021.9	-7048.2
82	-7298.3	-7300.3	-7322.9
83	-7604.2	-7603.3	-7633.8
84	-7988.3	-7988.2	-8001.7
85	-8287.8	-8290.9	-8304.9
86	-8719.7	-8719.1	-8743.4
87	-636.7	-635.9	-698.4
88	-3066.2	-3066.5	-3123.6
89	-4336.7	-4337.7	-4392.9
90	-5477.8	-5480.5	-5498.2
91	-5599.5	-5600.2	-5635.8

	AB	AC	AD
1	Surf_Georgetown_TVDSS	Surf_Georgetown_TVDSS_BASE	Surf_Kiamichi top_TVDSS
47	-8762.9		
48	-9105.8		
49	-9231.4	-9675.3	-9673.7
50	-9767.9		
51	-5391.8		
52	-7228.8		
53	-7580		
54	-8126	-8418.7	-8417.5
55	-8232.8		
56	-8645.6	-9030.7	-9028.2
57	-8778.8		
58	-8632.3		
59	-8747.5	-9197.1	-9196.1
60	-8711.3		
61	-9645	-10079.7	-10079.6
62	-1719.5		
63	-1111.1		
64	-5369.1		
65	-5078.6	-5273.8	-5275.1
66	-7133.2		
67	-7435		
68	-7559.5	-7933.7	-7932.5
69	-8173.4		
70	-8424		
71	-8720.5		
72	-8595.9	-9040.4	-9039.8
73	-8402	-8877.4	-8874.3
74	-9379.2	-9773	-9773.9
75	-992.1		
76	-2298.4		
77	-4061.5	-4256.7	-4257.1
78	-6169.8	-6481.6	-6482.1
79	-6641.8	-7015.4	-7014
80	-6650.1	-7073.7	-7070.6
81	-7049		
82	-7320.7	-7741.3	-7738.9
83	-7632.8	-8068.3	-8067.7
84	-8002.4	-8460.8	-8459.4
85	-8305.1	-8785.7	-8784.7
86	-8744.4	-9149.3	-9148.7
87	-697.5		
88	-3122.1	-3303.6	-3304.5
89	-4394.2	-4577.5	-4577.5
90	-5496.9	-5908.7	-5905.8
91	-5635.8	-6077.5	-6075.5

	A	B	C	D	E
1	UWI	WellName	Lat Top Hole	Lon Top Hole	DatumType
92	42289317260000	CHANEY J	31.172254	-96.221121	DF
93	42289310250000	STATE 93003	31.18143	-96.134249	DF
94	42289311250000	KNIGHT	31.23744	-95.94087	DF
95	42289311350000	ALBRECHT	31.26158	-95.8912	DF
96	42289311070000	AL FERRY	31.277099	-95.79643	DF
97	42225313720000		31.28058	-95.52866	DF
98	42225307020000	THOMAS A	31.27045	-95.3197	DF
99	42145303840000	GOODRICH N	31.29698	-97.19588	DF
100	42145303160000	BARGANIER J	31.258032	-97.014048	DF
101	42145305920000	BARGANIER	31.23776	-96.85505	DF
102	42293313790000	COYOTE CRK	31.237466	-96.565869	DF
103	42395313720000		31.23399	-96.395269	KB
104	42289314250000	HODGES	31.282876	-96.298583	UN
105	42289304030000	THORNE BARKLEY	31.295598	-96.173461	DF
106	42289310200000	BROWN	31.31872	-96.05988	DF
107	42289314730000	SANDEL O.K TAYLOR UNIT NO.2	31.341254	-95.945394	DF
108	42289311660000	COLLINS	31.365052	-95.832293	UN
109	42289311760000	CRAWFORD	31.38453	-95.79231	DF
110	42225307600000	MCFADDEN R ETAL	31.38045	-95.5339	DF
111	42225310310000	WHITEHEAD -A-	31.439756	-95.36961	DF
112	42145308020000	JACK WINKLES	31.357685	-97.018072	DF
113	42145304430000	LONG NIEMEYER & OTTO	31.40209	-96.86835	DF
114	42293312250000	BARRON	31.460007	-96.556693	DF
115	42293317570000		31.439801	-96.331929	DF
116	42293310350000	CHANDLER	31.43402	-96.25261	DF
117	42289312550000	CARBALAN	31.43922	-96.12641	DF
118	42289315740000	MILLER EVA MAE	31.452728	-96.034278	DF
119	42289304810000	LIPSEY	31.46752	-95.93062	UN
120	42289305900000	PLANTATION L	31.47595	-95.89441	DF
121	42289314670000	AROC ALLIED	31.490904	-95.780747	UN
122	42225300160000	HOUSER D	31.54022	-95.608485	DF
123	42225006210000	ELLIS EST	31.54061	-95.431317	DF
124	GC100000000000	GC-1	31.495005	-97.223056	DF
125	42293004250000		31.551739	-96.785157	DF
126	42293314840000	KENNEDY	31.582038	-96.571956	DF
127	42161322060000		31.576825	-96.282884	DF
128	42161312420000	SHELLEY	31.57769	-96.20678	DF
129	42161319760000	BURGHER NEAL	31.620191	-96.056079	DF
130	42161801300000	NCOC GREER BROS	31.60627	-95.9616	DF
131	42161328290000	PICKENS	31.579817	-95.925786	DF
132	42161310380000	CHILDRESS&KNOWLES	31.60655	-95.82211	UN
133	42001323670000	MONNIG	31.63192	-95.76254	DF
134	42001313680000	CAMP HEIRS	31.672091	-95.597789	DF
135	42001315530000	HAMILTON K	31.77058	-95.45716	DF
136	42293307720000	HAYTER	31.77651	-96.50565	DF

	F	G	H	I
1	DatumElevation	County	Surf_Austin Chalk_TVDSS	Surf_Austin Chalk_TVDSS_BASE
92	515	Leon	-5078.8	-5382.4
93	524.9	Leon	-5475.8	-5765.3
94	321	Leon	-5701.4	-6017.9
95	407	Leon	-5686.4	-6010
96	260	Leon	-6144.1	-6493.7
97	339.1	Houston	-6760.4	-7118.6
98	334.6	Houston	-7284.1	-7627.6
99	605	Falls	182.4	26.7
100	397	Falls	-268.1	-422.1
101	362	Falls	-1252.7	-1399.2
102	528	Limestone	-3091.1	-3390
103	443	Robertson	-3905.7	-4215
104	406.8	Leon	-4342.8	
105	426.5	Leon	-4749.3	-5057.8
106	417	Leon	-5048.4	-5398.6
107	423.2	Leon	-4679.6	-4974.2
108	445	Leon	-5390.8	-5707.9
109	295	Leon	-5435.1	-5787.5
110	421	Houston	-5980.5	-6340.7
111	367.5	Houston	-5603	-5890.1
112	380.6	Falls	-194.2	-318.8
113	497	Falls	-619.5	-840.1
114	475.7	Limestone	-2245.4	-2533.8
115	406	Limestone	-3457.9	-3819.6
116	492	Limestone	-3709.8	-4064.1
117	423.2	Leon	-4399.3	-4761.1
118	349	Leon	-4901.4	-5243.2
119	340	Leon	-4685.3	-4970.4
120	250	Leon	-4787.9	-5058.8
121	308.4	Leon	-4925.7	-5246.6
122	380.6	Houston	-5075.2	-5345.3
123	495.4	Houston	-5125.3	-5341.2
124	695	Mclennan	668.3	535
125	540	Limestone	-712.5	
126	474	Limestone	-1706.7	-2071.3
127	506	Freestone	-3216.6	-3601.7
128	514	Freestone	-3339.6	-3715.4
129	511.8	Freestone	-3775	-4069.5
130	348	Freestone	-4161.4	-4476.5
131	323	Freestone	-4377.1	-4698.3
132	284	Freestone	-4674.7	-4985
133	226.4	Anderson	-4388	-4631.2
134	410.1	Anderson	-4702	-4962.8
135	419.9	Anderson	-3097.3	-3350
136	503	Limestone	-2099.4	-2617.5

	J	K	L
1	Surf_UM:UEF_TVDSS	Surf_UM:UEF_TVDSS_BASE	Surf_MM:UEF_TVDSS
92	-5382.8	-5395.7	
93	-5766.3	-5787.8	-5785.3
94			
95			
96			
97			
98			
99	25.6	-31.7	-32.8
100	-420.4		-472.1
101	-1398.5	-1448.4	-1448.5
102	-3392.1	-3427.1	-3425.4
103			
104	-4628.8		-4667.5
105	-5059.9	-5082.8	-5082.4
106	-5399.7	-5416.1	-5416
107			
108			
109			
110			
111			
112	-317.8	-371.3	-371.2
113	-838.5	-899.6	-898.4
114	-2533.7	-2571.3	-2572.7
115	-3822.1	-3840.4	-3839.9
116	-4063.3	-4097	-4098
117	-4760.6	-4790.3	-4790.2
118	-5243.5	-5270.3	-5267.4
119			
120			
121			
122			
123			
124	533	445.8	445.8
125	-964.2		-1027.9
126	-2072.1	-2147.5	-2147.8
127	-3604.1	-3645	-3646.1
128	-3717.4	-3733.7	-3734.4
129	-4068.6	-4086.5	-4083.6
130	-4477.2	-4506.1	-4506.1
131			
132			
133			
134			
135			
136			-2618.4

	M	N	O
1	Surf_MM:UEF_TVDSS_BASE	Surf_LM:UEF_TVDSS	Surf_LM:UEF_TVDSS_BASE
92		-5394.9	-5580.8
93	-5814.9	-5819.3	-5968.4
94		-6017.1	-6128.4
95		-6010.4	-6111.3
96		-6493.3	-6630.5
97		-7119.2	-7210.1
98			
99	-64.6	-64.2	-87.1
100		-497.9	-529.3
101		-1475.5	
102	-3441.7	-3441.7	-3550.8
103		-4246.7	-4409.2
104		-4668.7	
105	-5105.3	-5107.4	-5232.9
106	-5444.9	-5448	-5602.9
107		-4972.9	-5036.3
108		-5709.2	-5924.6
109		-5788.7	-5969.2
110		-6342.5	-6448.3
111			
112	-399.6	-399.5	-432.9
113	-950.4	-950.4	-975
114	-2590	-2589	-2715.8
115	-3873.8	-3872.9	-4022.4
116	-4130.4	-4127.8	-4313.7
117	-4834	-4834.9	-5025.8
118	-5309.4	-5312.7	-5529.1
119		-4967.8	-5157
120		-5057.5	-5275.3
121		-5245.4	-5443.7
122		-5344.9	-5489.9
123		-5342.4	-5431.2
124	405.8	404.2	
125		-1066.7	
126	-2191.3	-2190.5	
127	-3695	-3691.1	-3821.6
128	-3766.2	-3767.1	-3930
129	-4127	-4127.9	-4320
130	-4529.9	-4530.2	-4731.2
131		-4700.5	-4907.5
132			
133		-4632.9	-4858.7
134		-4964.6	-5105.7
135		-3351.2	-3857.1
136	-2637.1	-2635.4	-2846.3

	P	Q	R
1	Surf_UM:LEF_TVDSS	Surf_UM:LEF_TVDSS_BASE	Surf_MM:LEF_TVDSS
92	-5579.1	-5734.9	-5735.3
93	-5967.9	-6100.3	-6103.8
94	-6126.4	-6283.8	-6283.6
95	-6108.1	-6243.3	
96	-6629.1	-6771.7	
97	-7209.7	-7394	
98			
99			-87.1
100			-531.3
101	-1502.9		-1525.8
102	-3548.7	-3647.1	-3647.4
103	-4409.1	-4545.4	-4547.4
104	-4821.2	-4972	-4973.4
105	-5234	-5364.5	-5365.9
106	-5603.4	-5707.4	-5708.5
107	-5038.4	-5113.3	-5114.2
108	-5922.9	-5982.1	
109	-5969	-6077.1	
110	-6446.1	-6612.5	
111	-5890	-5930.8	
112			-432.8
113			-976.3
114	-2715.4	-2785.4	-2786.4
115	-4020.7	-4118.3	-4117.3
116	-4312.9	-4408.7	-4408.8
117	-5024.5	-5076.5	-5074.5
118	-5529.7	-5575.7	-5575.2
119	-5157.4	-5213.8	-5213.7
120	-5273.2	-5321.2	-5320.2
121	-5445.3	-5491.2	-5489.1
122	-5492.8	-5527.4	
123	-5427	-5480.8	
124			389.2
125			-1085.4
126	-2281.3		-2345.8
127	-3820.3	-3903.7	-3904.1
128	-3932	-3978.7	-3978.7
129	-4319.9	-4357.8	-4358.2
130	-4728.4	-4768.3	-4767.2
131	-4906.6	-4945.4	-4946.3
132			
133	-4859.6	-4890.4	
134	-5106.6	-5175.3	
135			
136	-2847.1	-2867.1	-2866.7

	S	T	U
1	Surf_MM:LEF_TVDSS_BASE	Surf_LM:LEF_TVDSS	Surf_LM:LEF_TVDSS_BASE
92	-5936.6	-5937.1	-5972
93	-6289.4		
94	-6380.4		
95			
96			
97			
98			
99	-116.3	-116.1	-138.4
100	-552.2	-551.8	-586.8
101	-1548.9	-1549.8	-1573.9
102	-3774.2	-3774.5	-3792.1
103	-4676.6	-4675.6	-4706.6
104	-5094.1		
105	-5478.2		
106	-5799.9		
107	-5145		
108			
109			
110			
111			
112	-462.9	-461.7	-502.5
113	-998.8	-1000.1	
114	-2839.2	-2839.2	
115	-4229.9		
116	-4492		
117	-5177.8		
118	-5661.1		
119	-5264.6		
120	-5385.4		
121	-5533.3		
122			
123			
124	363.7	364.2	335.8
125		-1140.7	
126		-2398.8	-2417.1
127	-4011.6		
128	-4085.4		
129	-4412		
130	-4822.8		
131	-4989.2		
132			
133			
134			
135			
136	-2917.1		

	V	W	X
1	Surf_Woodbine_TVDSS	Surf_Woodbine_TVDSS_BASE	Surf_Buda_TVDSS
92	-5974.5	-6144.1	-6143.7
93	-6287.9	-6595.3	-6594.4
94	-6379.8	-6888.8	-6885.4
95	-6244.2	-6893.3	-6894.1
96	-6769.9	-7495.8	-7496.1
97	-7394.3	-8045.3	-8046.3
98	-7628.4	-8374.7	-8373.8
99	-138.1	-173	-173.8
100	-585.9	-621	-621.8
101	-1574.5	-1629.3	-1628.5
102	-3792.9	-3911.3	-3909.9
103	-4707.6	-4857.8	-4857.2
104	-5093.4	-5358.7	-5357.9
105	-5477.2	-5813.6	-5812.2
106	-5802.5	-6272.4	-6270.1
107	-5146.3	-5720.8	-5718.6
108	-5979.8	-6682.5	-6681.3
109	-6076.8	-6806.2	-6806.8
110	-6614.5	-7314.5	-7313.1
111	-5929.6	-6717.6	-6718.6
112	-504.2	-547.5	-549.5
113	-1048.8	-1102.6	-1104.1
114	-2868.8	-3049.2	-3047.4
115	-4230.6	-4557	-4555.3
116	-4491.3	-4859.1	-4857.4
117	-5178.5	-5628.6	-5628.6
118	-5659.4	-6212.4	-6210.9
119	-5262.9	-5886.7	-5884.7
120	-5385.3	-6038.3	-6039.2
121	-5534.5	-6233.3	-6233.4
122	-5527.3	-6394.5	-6393.8
123	-5481.5	-6314.2	-6314.9
124	334.6	274.6	
125	-1187.5		-1317.5
126	-2416.5	-2642.5	-2639.4
127	-4011.4	-4427.8	-4428.1
128	-4085.7	-4541.2	-4538.1
129	-4411.1	-4997	-4997.6
130	-4822.2	-5494	-5493.5
131	-4987.4	-5695	-5693.8
132	-4985	-5789.6	-5789
133	-4889.6	-5600	-5600
134	-5177	-6144.5	-6142.6
135	-3858.8	-4568.8	-4566.5
136	-2916.3	-3272.5	-3274.1

	Y	Z	AA
1	Surf_Buda_TVDSS_BASE	Surf_Del Rio/ Grayson_TVDSS	Surf_Del Rio/ Grayson_TVDSS_BASE
92	-6217.4	-6219.9	-6262.4
93	-6660.7	-6663.8	-6708.2
94	-6959.2	-6960.3	-6980.4
95	-6965.8	-6965.8	-6993.3
96	-7578.3	-7577.8	-7595
97	-8111.5	-8111.1	-8129.9
98	-8439.7	-8442.2	-8460.5
99	-184.7	-184.1	-253.4
100	-654.7	-653.8	-724.3
101	-1678.9	-1679.8	-1749.7
102	-3993.8	-3992.8	-4057.1
103	-4948.2	-4946.9	-4978.6
104	-5455.4	-5454	-5493.7
105	-5918.6	-5920.3	-5949.1
106	-6371.9	-6373.4	-6396.9
107	-5813.3	-5813.8	-5830
108	-6772.9	-6774.1	-6797.1
109	-6891.7	-6891.7	
110	-7389.9	-7390.1	-7412.4
111	-6810.1	-6810.6	-6822.6
112	-576.6	-576.7	-638.7
113	-1147.6	-1147.8	-1213
114	-3122.1	-3120.5	-3194.6
115	-4629.9	-4631	-4696.1
116	-4918.7	-4919.6	-4984.9
117	-5700.7	-5699.1	-5767.4
118	-6321.9	-6320.9	-6354.9
119	-5982.1	-5983.5	-6000.4
120	-6122.5	-6122.5	-6156.3
121	-6294.6	-6295.7	-6319.6
122	-6496.1	-6496.8	-6528.2
123	-6406.7	-6407.9	-6435.1
124		275	210
125		-1352.1	
126	-2730.8	-2732.1	-2791.3
127	-4537	-4537.4	-4563.2
128	-4656.2	-4657.3	-4698.3
129		-5093.6	-5163.6
130	-5597.4	-5598	-5639
131	-5810.4	-5810.4	-5842.1
132	-5894.6	-5896	-5955.4
133	-5700	-5699.7	-5732.9
134	-6279.5	-6277.3	-6317
135	-4682.1	-4681.9	-4695.9
136	-3365	-3364.8	-3414.6

	AB	AC	AD
1	Surf_Georgetown_TVDSS	Surf_Georgetown_TVDSS_BASE	Surf_Kiamichi top_TVDSS
92	-6261.1	-6717.8	-6717.1
93	-6708.8	-7177	-7177
94	-6980.7	-7430.4	-7431.1
95	-6993.3	-7462.5	-7459.4
96	-7593.8	-8115	-8114.7
97	-8127.7	-8639	-8641.1
98	-8459.3	-8891.4	-8892.1
99	-254.1		
100	-723.8	-877.6	-877.8
101	-1749.1		
102	-4057.5	-4375.8	-4376.3
103	-4979.5	-5415.3	-5411.8
104	-5493	-5937.5	-5935.3
105	-5950.3	-6404.9	-6404.3
106	-6394.7	-6906.1	-6905.4
107	-5830	-6200.8	-6199.9
108	-6797	-7327.5	-7326.4
109	-6918.8	-7486.7	-7485.8
110	-7411.3	-7994.9	-7995.1
111	-6824.3	-7386.3	-7388.3
112	-638.2		
113	-1213.4	-1403.8	-1405.4
114	-3194.5	-3530.4	-3532.1
115	-4695	-5238.6	-5237.4
116	-4985.1	-5532.4	-5532.1
117	-5767	-6324.5	-6326.2
118	-6355.1		
119	-6001.5	-6535	-6536
120	-6155	-6720	-6720.5
121	-6318.4	-6825	-6823.7
122	-6526.1	-7136.5	-7138.2
123	-6432.4	-7034.7	-7037.2
124	210.2		
125	-1433.7		
126	-2791.1	-3157.9	-3156.1
127	-4563.4	-5111.6	-5110.7
128	-4698.4	-5252.4	-5254.7
129	-5164	-5782	-5780
130	-5639.5	-6249.9	-6251.8
131	-5839.9	-6476.7	-6478.4
132	-5952.7	-6559.2	-6557.5
133	-5733	-6268.7	-6270.1
134	-6317	-7089.9	-7089.5
135	-4696.2	-5230.1	-5230.5
136	-3412.4		

	A	B	C	D	E
1	UWI	WellName	Lat Top Hole	Lon Top Hole	DatumType
137	42161335590000	STEWARD	31.783927	-96.208945	DF
138	42161318400000	AULTMAN	31.78882	-96.124302	DF
139	42161316270000	HILL	31.78486	-96.018499	DF
140	42001324070000		31.814886	-95.917008	DF
141	42001318520000	ALLAUN C	31.79657	-95.87907	DF
142	42001006500000	HUFFMAN J C & FW	31.798237	-95.796167	DF
143	42001323250000	ROYALL NAT'L	31.84444	-95.62619	DF
144	42001025450000	CARPENTER B	31.945549	-95.485833	DF
145	42349337670000	MAYS A	31.97469	-96.46138	DF
146	42349345790000	TROEGEL	31.946591	-96.22958	DF
147	42161316520000	WOLENS	31.92119	-96.10688	DF
148	42161308450000	HARWELL M	31.918679	-96.018901	DF
149	42001323580000	MALONE	31.880319	-95.930718	DF
150	42001309370000	VANNDY J	31.917716	-95.811997	DF
151	42001315400000	LARDE	31.99137	-95.67534	DF
152	42001312650000	COOK R	32.00153	-95.53335	DF
153	42349349570000	BANCROFT UNIT	32.071327	-96.216858	DF
154	42213302390000	TP&L	32.100131	-96.087192	DF
155	42213309000000	JACKSON WL	32.096732	-95.994957	DF
156	42213306600000	MILLER	32.12415	-95.92039	DF
157	42213309460000	CATFISH CREEK 2	32.041229	-95.787811	DF
158	42213306570000	WALLACE	32.08369	-95.67297	DF
159	42213005620000	AUSTIN S ETAL	32.094521	-95.545342	DF
160	42213308160000	HOOPER	32.285601	-96.20857	DF
161	42213300490000	JONES A	32.27375	-96.021933	DF
162	42213302810000	COLLINS NICHOLAS R	32.25973	-95.982983	DF
163	42213308810000	DAVIS,L.P	32.295176	-95.866633	DF
164	42213310500000	DOHENY	32.297749	-95.751084	DF
165	42213305470000	HARVARD J	32.30236	-95.696631	DF
166	42213307920000	CADE	32.310786	-95.471119	DF
167	42213304900000	WILLIAMS	32.3354	-96.32857	DF
168		GC-2	32.6913	-96.892	DF
169	42113331790000		32.652223	-96.906389	DF
170	42139146910000		32.538333	-96.955555	DF
171	42139000280000	KIRKPATRICK L	32.363427	-96.505102	DF
172	42349314300000		32.214639	-96.450749	DF
173	42349340980000	SLOAN	32.1323	-96.32657	DF
174	42349314220000	FARMER	31.945603	-96.334422	DF
175	42161315890000	LANE	31.77239	-96.32503	DF
176	42293313660000	KOTT	31.57891	-96.41855	DF
177	42293313430000	BROWDER	31.44545	-96.4452	DF
178	42395307860000	REAGAN	31.239081	-96.458426	DF
179	42395311080000	PYE GAS UNIT	31.054183	-96.520321	DF
180	42395302560000	NAVAJO & CORONA	30.883139	-96.561701	DF
181	42395302420000		30.834869	-96.532774	DF

	F	G	H	I
1	DatumElevation	County	Surf_Austin Chalk_TVDSS	Surf_Austin Chalk_TVDSS_BASE
137	406	Freestone	-2941.8	-3336.7
138	423	Freestone	-3201.1	-3579.5
139	492	Freestone	-3755.7	-4142.4
140	248	Anderson	-4824.2	-5351.1
141	297	Anderson	-3901.4	-4234.2
142	336	Anderson	-3910.6	-4223.3
143	485.6	Anderson	-4387.4	-4662.8
144	370.7	Anderson	-7535.3	-7773.8
145	347	Navarro	-1572.1	-1997.1
146	370.7	Navarro	-2393	-2790
147	330	Freestone	-3009.4	-3419.9
148	272.3	Freestone	-2976.1	-3341.5
149	316	Anderson	-4531.8	-5041.1
150	383	Anderson	-3638.9	-3987
151	498	Anderson	-3855.7	-4185.7
152	603	Anderson	-4319.7	-4591.7
153	390	Navarro	-2308.5	-2697.1
154	318	Henderson	-2935	-3368.3
155	295.3	Henderson	-2973.5	-3389.9
156	433.1	Henderson	-3109.2	-3503.2
157	413.4	Henderson	-4070	-4448.3
158	544	Henderson	-3539.1	-3867.9
159	648	Henderson	-4032.2	-4270.5
160	367.5	Henderson	-2101.5	-2284.6
161	427	Henderson	-2676.7	-3104.1
162	418	Henderson	-2861.7	-3251.9
163	479	Henderson	-3070.1	-3485.7
164	488	Henderson	-3410.1	-3749.5
165	442.9	Henderson	-3262.6	-3602.4
166	415	Henderson	-3973.4	-4226.3
167	389	Henderson	-1667.9	-1842.2
168	710	Dallas		
169	717	Dallas		
170	804	Ellis		
171	400.3	Ellis	-460.8	-931.7
172	434	Navarro	-913.6	-1365
173	417	Navarro	-2304.1	
174	335	Navarro	-2088.1	-2506
175	476	Freestone	-2531.4	-2912.2
176	515.1	Limestone	-2768.6	
177	488.8	Limestone	-2872.6	-3209.7
178	475	Robertson	-3522.1	-3802.6
179	570.9	Robertson	-4227.2	-4479.7
180	374	Robertson	-5344.7	-5600.5
181	422	Robertson	-5805.1	-6008.4

	J	K	L
1	Surf_UM:UEF_TVDSS	Surf_UM:UEF_TVDSS_BASE	Surf_MM:UEF_TVDSS
137	-3336.3	-3374.6	-3375.4
138	-3578.9	-3612	-3614
139	-4143.2	-4191.1	-4192.1
140	-5352.9	-5391.5	-5390.3
141	-4235.9	-4276.7	-4274.2
142			
143			
144			
145	-1997.1	-2026.3	-2027.1
146	-2790.1	-2827.5	-2827.4
147	-3421.2	-3449.1	-3449.5
148	-3343.2	-3358.6	-3359.5
149	-5041.3		-5098.8
150	-3989.5	-4004.1	-4004.5
151			
152			
153	-2697.9	-2726.3	-2723.8
154	-3369.1	-3399.9	-3399.3
155	-3388.1	-3422.4	-3421.3
156	-3505.4	-3521.1	-3521.2
157	-4449.4	-4474.6	-4475.4
158			
159			
160	-2284.3	-2312.5	-2313.9
161	-3103.7	-3129.5	-3130.7
162	-3250.5	-3279.9	-3284.9
163	-3486.5	-3507.8	-3507.5
164	-3751.1	-3762	-3760.1
165			-3603.5
166			
167	-1842.8	-1873.1	-1872.5
168	531.7		421.1
169	542.6		419.8
170	617.7		512.8
171	-932.4	-990.1	-990.6
172	-1367.6	-1378.3	-1378
173			
174	-2507.1	-2547.6	-2550.1
175	-2911.4	-2947.6	-2947.4
176			
177	-3211	-3252.2	-3253.9
178	-3805.1	-3836.8	-3837.2
179			
180			
181			

	M	N	O
1	Surf_MM:UEF_TVDSS_BASE	Surf_LM:UEF_TVDSS	Surf_LM:UEF_TVDSS_BASE
137	-3415.8	-3415.4	
138	-3684.9	-3685.9	
139	-4224.9	-4226.1	
140	-5421.2	-5420.4	
141	-4305.8	-4305.4	
142		-4222.7	
143		-4664.2	
144		-7775.1	-7986.3
145	-2072.1	-2067.5	-2177.9
146	-2876.7	-2877.4	-3112.5
147	-3525.4	-3525.2	-3758.7
148	-3416.9	-3412.5	-3626.5
149	-5137.9	-5137.5	-5487.8
150	-4023.8	-4024.6	-4332.1
151		-4186.4	-4435.7
152		-4591.2	-4847.1
153	-2776.3	-2776.1	-3013.3
154	-3449.5	-3449.8	-3777.9
155	-3489	-3487.4	-3710.7
156	-3558.6	-3556.7	-3836.5
157	-4518.7	-4519.1	-4856.6
158		-3866.7	-4155.7
159		-4272.2	-4520.1
160	-2400	-2395.3	-2650.8
161	-3172.4	-3174.2	-3484.5
162	-3325.3	-3325.3	-3657.4
163	-3558.2	-3556.5	-3907.8
164	-3795	-3794.8	-4116.6
165	-3617.8	-3618.2	-3938.2
166		-4229.1	-4610.5
167	-1956.8	-1956.5	-2218.9
168		397.8	
169		402.8	
170		490.6	
171	-1029.2	-1027.4	-1327.5
172	-1447.5	-1445.9	-1678.3
173		-2858.1	-3120
174	-2603.1	-2604.8	-2830.5
175	-2991.8	-2990.5	-3156.8
176		-3258.3	
177	-3276.8	-3277.3	-3431.8
178	-3849.7	-3847.6	-3998
179		-4481.8	-4637.2
180		-5602.1	-5688
181		-6007.5	-6089.3

	P	Q	R
1	Surf_UM:LEF_TVDSS	Surf_UM:LEF_TVDSS_BASE	Surf_MM:LEF_TVDSS
137	-3590.8	-3640.8	-3641.7
138	-3884.5	-3914.5	-3915.8
139	-4507.1	-4558.2	-4557.5
140	-5853.1	-5895.7	-5897.1
141	-4539.4	-4622.1	-4621
142	-4469.6		-4491.2
143	-4839.6	-4868.3	-4867.9
144			
145			-2179.5
146			-3113.4
147			-3759.4
148			-3625.8
149			-5488.5
150			-4331.6
151			-4436.2
152			-4847.4
153			-3015.1
154			-3776.1
155			-3711.1
156			-3837.2
157			-4857
158			-4156.6
159			
160			-2650.3
161			-3484.9
162			-3661.1
163			-3909.5
164			-4120.1
165			-3937.2
166			
167			-2217.2
168			148.3
169			176.8
170			236.7
171			-1326.9
172			-1678.8
173			-3123.3
174	-2830.5	-2842.2	-2843.9
175	-3156	-3191	-3192
176	-3379		-3440.7
177	-3431	-3482.2	-3481
178	-3998.3	-4129.3	-4128.3
179	-4636.4		-4762.6
180	-5687.6	-5820.5	-5821.8
181	-6089.8	-6218.8	-6219.8

	S	T	U
1	Surf_MM:LEF_TVDSS_BASE	Surf_LM:LEF_TVDSS	Surf_LM:LEF_TVDSS_BASE
137	-3693.2		
138	-3977		
139	-4648.2		
140	-5955.3		
141	-4665		
142	-4515.8		
143	-4881.6		
144			
145	-2223.8		
146	-3160.3		
147	-3822.9		
148	-3695.3		
149	-5519.9		
150	-4348.7		
151	-4447.8		
152	-4855.9		
153	-3048.3		
154	-3831.2		
155	-3744.9		
156	-3865.3		
157	-4885.4		
158	-4173.2		
159			
160	-2707.1		
161	-3539.1		
162	-3699		
163	-3944.4		
164	-4135.4		
165	-3949.5		
166			
167	-2259.3		
168			
169			
170			
171	-1392.5		
172	-1701.3		
173	-3155.4		
174	-2896.4		
175	-3241		
176		-3500.3	
177	-3525.5	-3525.5	-3549.3
178	-4245.1	-4246.4	-4274.3
179	-4858	-4858.5	-4876.8
180	-5917.6	-5916.8	-5943
181	-6312.6	-6314.2	-6350.5

	V	W	X
1	Surf_Woodbine_TVDSS	Surf_Woodbine_TVDSS_BASE	Surf_Buda_TVDSS
137	-3695.4	-4227	-4227.2
138	-3979.6	-4533.3	-4532.4
139	-4649.6	-5307.4	-5305.1
140	-5957.5	-6852.4	-6853.1
141	-4664.3	-5516.7	-5517.1
142	-4516.6	-5415.4	-5413.7
143	-4882.5	-5785.8	-5787.8
144	-7985.7	-8884.7	-8884.4
145	-2224.2	-2719.7	-2720.4
146	-3160.1	-3717.8	-3716
147	-3821.7	-4448.3	-4449.5
148	-3695.7	-4372.4	-4373.8
149	-5521.9	-6074.9	-6076.8
150	-4349.2	-5274.6	-5274.2
151	-4449.7	-5451.6	-5447.5
152	-4855.7	-5860.1	-5857.5
153	-3048.8	-3659.9	-3663.1
154	-3831.2	-4624.1	-4625.4
155	-3744	-4510.7	-4510.4
156	-3865.8	-4643.2	-4642.7
157	-4886.4	-5853.7	-5854.7
158	-4175.4	-5167.8	-5165.2
159	-4522.2	-5495.1	-5497.5
160	-2706.9	-3358.6	-3358.8
161	-3540.4	-4339.9	-4339
162	-3699.9	-4512	-4508.1
163	-3943.6	-4806.9	-4803.6
164	-4136.1	-5078.7	-5075.9
165	-3949	-4869.1	-4870.9
166	-4609.1	-5594.6	-5593.7
167	-2261.5	-2831	-2830.3
168	99		
169	105.7		
170	210.7		
171	-1390.7	-1809.2	-1809.2
172	-1700.7	-2250.4	-2249.5
173	-3155.1	-3772.5	-3771.4
174	-2896.3	-3354.3	-3351.8
175	-3244	-3707.2	-3708.1
176	-3518		-3822.6
177	-3549.3	-3808.9	-3807.6
178	-4272	-4394.7	-4395.1
179	-4879.2	-4982.6	-4984.5
180	-5943.6	-6050.1	-6051.1
181	-6353.8	-6475.1	-6471.8

	Y	Z	AA
1	Surf_Buda_TVDSS_BASE	Surf_Del Rio/ Grayson_TVDSS	Surf_Del Rio/ Grayson_TVDSS_BASE
137	-4303.2	-4304.1	-4386.6
138	-4602.4	-4599.6	-4690.4
139	-5403.6	-5405.7	-5484.1
140	-6962	-6962.8	-7042
141	-5605.4	-5602.1	-5648.3
142	-5565.8	-5566.7	-5630.4
143	-5918.6	-5918.6	-5964.9
144	-9045.1	-9045.4	-9078
145	-2789.2	-2787.8	-2878.8
146	-3824	-3823.8	-3874.9
147	-4561.2	-4561.5	-4630.4
148	-4456.1	-4454	-4555.7
149	-6179	-6179.5	-6227.8
150	-5395.8	-5398.2	-5472.5
151	-5552.8	-5555.5	-5628.6
152	-6005.9	-6004.8	-6077.6
153	-3768.2	-3765.1	-3839.9
154	-4734.9	-4736.4	-4835.4
155	-4645.7	-4645	-4726.1
156	-4786.1	-4788	-4841.5
157	-5985.8	-5983.8	-6051.7
158	-5336.6	-5341	-5416.6
159	-5648.4	-5648.8	-5705.9
160	-3448.6	-3447.9	-3522.4
161	-4450.8	-4451.2	-4511.6
162	-4638.6	-4638.8	-4715.7
163	-4932.4	-4934.9	-5030.3
164	-5225.4	-5223.2	-5293.7
165	-5031.6	-5031.1	-5088.2
166	-5763.4	-5762	-5820.5
167	-2902.2	-2904.2	-2976.8
168			
169		-441.4	
170		-231.8	
171		-1846.3	-1899.6
172	-2308.8	-2307.3	-2370
173		-3874.8	
174	-3463.5	-3463.8	-3536.8
175	-3798.5	-3798.8	-3853
176		-3920.7	
177	-3885.5	-3886	-3930.5
178	-4486.8	-4486.5	-4522.1
179	-5076.4	-5078.2	-5096.8
180	-6133.4	-6134.1	-6156.3
181	-6551.3	-6551.4	-6575.5

	AB	AC	AD
1	Surf_Georgetown_TVDSS	Surf_Georgetown_TVDSS_BASE	Surf_Kiamichi top_TVDSS
137	-4387.1	-5040.7	-5040.8
138	-4689.9	-5326.2	-5328
139	-5485.7	-6086.6	-6089.1
140	-7040.8	-7750.7	-7749.2
141	-5647.1	-6372.9	-6369.6
142	-5629	-6267.9	-6266.1
143	-5964.4	-6746.5	-6750.2
144	-9075.4	-9770.5	-9769
145	-2878.4		
146	-3874.9	-4425.3	-4424.1
147	-4629.5	-5239.1	-5237.8
148	-4554.4	-5201.1	-5199.2
149	-6226.5	-7024.5	-7024.5
150	-5471.3	-6206.7	-6204.9
151	-5628	-6507.4	-6505.8
152	-6076.8	-6887.6	-6887.1
153	-3836.1	-4449.5	-4447.8
154	-4834.6	-5582.4	-5581.5
155	-4723.6	-5477.8	-5474.1
156	-4841.8	-5572.4	-5572.3
157	-6053.7	-6919.2	-6918.7
158	-5416	-6486.6	-6479.5
159	-5705.5	-6516.3	-6517.3
160	-3523.3	-4097.4	-4095.3
161	-4509.6	-5275.4	-5280.8
162	-4714.3	-5523.6	-5522.2
163	-5029.9	-5840.3	-5838.5
164	-5292.6	-6109.2	-6106.4
165	-5084.6		
166	-5820.3	-6553.8	-6552.4
167	-2973.4	-3494.3	-3493.5
168			
169	-492		-624.2
170	-296.4		-745.6
171	-1899.6		-2335
172	-2367.6	-2828.8	-2827.5
173	-3952.5	-4672.6	-4674.5
174	-3536.7		
175	-3853.1	-4367.2	-4368.6
176	-3958.1	-4430.5	-4434.3
177	-3929.6	-4378	-4376.3
178	-4523.3	-4913	-4912.1
179	-5096.4	-5438.8	-5435.2
180	-6156.1		
181	-6575.4		

	A	B	C	D	E
1	UWI	WellName	Lat Top Hole	Lon Top Hole	DatumType
182	42395302450000	HUDSON	30.743118	-96.565113	DF
183	42041313600000	NEWBERRY M	30.66628	-96.54461	DF
184	42041308310000	KAVANAUGH	30.63518	-96.5495	DF
185	42051332030000	ACCRUSO	30.57689	-96.50416	DF
186	42051336380000	Elsik	30.484163	-96.521583	DF

	F	G	H	I
1	DatumElevation	County	Surf_Austin Chalk_TVDSS	Surf_Austin Chalk_TVDSS_BASE
182	278.9	Robertson	-6092.2	-6260.5
183	274	Brazos	-6649.4	-6811.7
184	255.9	Brazos	-6821.5	-6965.9
185	259	Burleson	-7226.2	-7348.7
186	327	Burleson	-8572.7	

	J	K	L
1	Surf_UM:UEF_TVDSS	Surf_UM:UEF_TVDSS_BASE	Surf_MM:UEF_TVDSS
182			
183			
184			
185			
186			

	M	N	O
1	Surf_MM:UEF_TVDSS_BASE	Surf_LM:UEF_TVDSS	Surf_LM:UEF_TVDSS_BASE
182		-6258.8	-6312.6
183			
184			
185			
186			

	P	Q	R
1	Surf_UM:LEF_TVDSS	Surf_UM:LEF_TVDSS_BASE	Surf_MM:LEF_TVDSS
182	-6312.5	-6429.7	-6429.6
183	-6810.9	-6957.6	-6957.4
184	-6966.2	-7110.9	-7109.2
185	-7348.8	-7525.3	-7518
186	-8649.6	-8785	-8785.8

	S	T	U
1	Surf_MM:LEF_TVDSS_BASE	Surf_LM:LEF_TVDSS	Surf_LM:LEF_TVDSS_BASE
182	-6536.3	-6534.6	-6560.5
183	-7075.5	-7073.4	-7105.1
184	-7199.2	-7200.9	-7240.9
185	-7603.7	-7603.8	-7657.4
186	-8811.2	-8812.2	-8867

	V	W	X
1	Surf_Woodbine_TVDSS	Surf_Woodbine_TVDSS_BASE	Surf_Buda_TVDSS
182	-6561.9	-6671.7	-6672.6
183	-7106.4	-7213.8	-7213
184	-7241.9	-7350.9	-7350.2
185	-7656.8	-7789.1	-7785.1
186	-8867.7	-8912.9	-8912.4

	Y	Z	AA
1	Surf_Buda_TVDSS_BASE	Surf_Del Rio/ Grayson_TVDSS	Surf_Del Rio/ Grayson_TVDSS_BASE
182	-6745.5	-6745.9	-6767.2
183	-7273.8	-7275.5	-7288.8
184	-7403	-7403.2	-7419.2
185			
186			

	AB	AC	AD
1	Surf_Georgetown_TVDSS	Surf_Georgetown_TVDSS_BASE	Surf_Kiamichi top_TVDSS
182	-6766.2		
183	-7290		
184	-7419.3		-7659.9
185			
186			