**SUPPLEMENTARY ITEM S2: DZ U-PB SAMPLE SEDIMENTOLOGICAL DESCRIPTIONS**

***Dawson Creek Samples***

*Aguja Formation*

16TO-18 and 16TO-17 were collected from fine-to-medium grained, trough cross-stratified sandstone at approximately the same stratigraphic horizon below the sections measured by Atchley et al. (2004) and Lehman (2018). 16TO-19 was collected from very fine-to-fine grained sandstone (same sandstone as Fig. 4A in Atchley et al., 2004) in the upper Aguja Formation.

*Javelina Formation*

16TO-20 was collected from a fine grained, thin-bedded sandstone in the lower Javelina Formation. 18TO-02 was collected from lower medium grained, trough cross-stratified sandstone with ripple topped beds and lenticular geometries in the uppermost Javelina Formation.

*Lower Black Peaks Formation*

18TO-06 was collected from lower medium grained, massive to trough cross-stratified to planar laminated sandstone.

*Canoe Formation*

18TO-04 was collected from upper fine-to-lower medium, massive, white sandstone in the lowermost Canoe. 18TO-03 and 18TO-05 were collected from separate beds of lower medium-upper medium, white, trough cross-stratified-to-ripple laminated, thick-bedded sandstone.

***Glenn Springs Draw Samples***

*Lower Black Peaks Formation*

16TO-21 and 16TO-22 were collected were collected from very fine-to-fine grained, massive-to-trough cross-stratified, very thick-bedded sandstones.

***Tornillo Flat Samples***

*Javelina Formation*

16TO-01 was collected from a fine-to-medium grained, trough cross-stratified-to-planar laminated, tabular, thick-bedded sandstone.

*Lower Black Peaks Formation*

16TO-02 was collected from fine-to-medium grained, trough cross-stratified sandstone near the base of the Black Peaks Formation. 16TO-03 and 16TO-04 were collected from medium grained, trough cross-stratified-to-massive, very thick-bedded, broadly lenticular sandstones in the lower Black Peaks Formation.

*Upper Black Peaks Formation*

16TO-05 and 16TO-06 were collected from medium grained, trough cross-stratified-to-planar laminated, very thick-bedded, broadly lenticular sandstones. 16TO-07 was collected from a fine-to-medium grained, massive, thick-bedded, lenticular sandstone. 16TO-09 and 16TO-10 were collected from fine-to-medium grained, trough cross-stratified, very thick-bedded, broadly lenticular sandstones. 16TO-08 was collected from a medium-coarse grained, planar laminated-to-trough cross-stratified, very thick-bedded, broadly lenticular sandstone. It is notable that 16TO-08 was collected from sandstone just above/coincident with the PETM horizon as determined by Bataille et al. (2016, 2019). The other samples all represent pre-PETM Black Peaks Formation.

*Hannold Hill Formation*

16TO-11 was collected from fine-to-medium grained, trough cross-stratified, very thick-bedded, lenticular sandstone with granular-pebble conglomerate lenses. 16TO-11 is from the Exhibit sandstone (e.g., Bataille et al., 2016; Lehman et al., 2018) in west Tornillo Flat, a broadly tabular sheet of amalgamated, lenticular sandstones the form the base of the Hannold Hill Formation. 16TO-15 was collected from a medium grained, trough cross-stratified sandstone that is the south Tornillo Flat equivalent of the basal Exhibit sandstone. 18TO-01 was collected from a upper medium-to-lower coarse, poorly sorted, trough cross-stratified, ~70 cm-thick sandstone lens within a pebble-cobble, clast-supported, imbricated, very thick-bedded conglomerate with limestone and chert clasts. 16TO-12 was collected from a medium grained, trough cross-stratified sandstone in another stack of amalgamated, lenticular sandstones in the upper Hannold Hill Formation.

*Canoe Formation*

16TO-13 was collected from a medium grained sandstone that overlies a pebble conglomerate-to-sandstone bed that forms the base of the Canoe Formation at the top of the Exhibit Ridge section in west Tornillo Flat. 16TO-14 was collected from a fine grained, trough cross-stratified, very thick-bedded, broadly lenticular sandstone in south Tornillo Flat. 16TO-16 was collected from a medium grained, trough cross-stratified, very thick-bedded sandstone with conglomeratic lenses at the base of the Canoe Formation in south Tornillo Flat.