



TCU University #3 - FRAC

October 10, 2015

MIRU wireline truck. RIH & perforated: 12,034'-12,039'; 11,986'-11,991'; 11,964'-11,969'; 11,918'-11,923'. All shots fired.

October 12, 2015

MIRU frac equipment. Fractured well as follows:

Stage 1:

SICP: 341 psi. Formation broke at 6,070 psi while pumping at 4.4 bpm. Fractured zone by pumping 141 bbls of 15% HCL & 1669 bbls of Slickwater. ISIP 5,206 psi with a frac gradient of 0.867 psi/ft. Qavg: 27.6 bpm, Pavg: 6,484 psi, Qmax: 38 bpm, Pmax: 7,295 psi. Treating pressure was too high. SD frac to re-perforate.

Total load to recover: 1810 bbls.

Re-perforated Stage 1 as follows: 12,028'-12,032'; 12,006'-12,010'; 11,940'-11,944'; 11,890'-11,894'; 11,866'-11,870'. All shots fired.

Stage 2:

SICP: 4,093 psi. Formation broke at 5,022 psi while pumping @ 3.5 bpm. Fractured zone by pumping 94 bbls of acid, 1,097 bbls Slickwater, 1,528 bbls of 12# linear gel, 2,819 bbls of 12# XLink gel, 11,674# of 100 mesh sand, & 92,025# 30/50 MG Lite. Total proppant pumped: 103,699#. ISIP 4,346 psi with a frac gradient of 0.796 psi/ft. Qavg: 55.7 bpm, Pavg: 5,894 psi, Qmax: 60 bpm, Pmax: 7,332 psi.

Load to recover for this stage: 5,538 bbls.

Total load to recover: 7,352 bbls.

RIH & set Stage 3 CBP at 11,810'. Perforated: 11,780'-11,784'; 11,740'-11,744'; 11,714'-11,718'; 11,688'-11,692'; 11,634'-11,638'. All shots fired.

Stage 3:

SICP: 881 psi. Formation broke at 4,299 psi while pumping @ 3.6 bpm. Fractured zone by pumping 95 bbls 15% HCL acid, 1,298 bbls Slickwater, 780 bbls of 8# linear gel, 2,279 bbls of 10# XLink gel, 8,318# of 100 mesh sand, & 76,875# 30/50 MG Lite. Proppant pumped this

stage: 85,193#. Total proppant pumped: 188,892#. ISIP 4,428 psi with a frac gradient of 0.811 psi/ft. Qavg: 58.8 bpm, Pavg: 5,801 psi, Qmax: 64.4 bpm, Pmax: 7,066 psi.

Load to recover for this stage: 4,452 bbls.
Total load to recover: 11,801 bbls.

RIH & set Stage 4 CBP at 11,550'. Perforated: 11,496'-11,500'; 11,455'-11,459'; 11,420'-11,424'; 11,369'-11,373'; 11,327'-11,331'. All shots fired.

October 13, 2015

Stage 4:

SICP: 1,829 psi. Formation broke at 3,052 psi while pumping @ 3.3 bpm. Fractured zone by pumping 94 bbls of 15% HCL acid, 2,714 bbls Slickwater, 520 bbls of 8# linear gel, 1,161 bbls of 10# XLink gel, 1,339 bbls of 12# XLink gel, 7,847# of 100 mesh sand, & 84,780# of 30/50 MG Lite. Proppant pumped this stage: 95,150#. Total proppant pumped: 284,042#. ISIP 5,354 psi with a frac gradient of 0.901 psi/ft. Qavg: 57.4 bpm, Pavg: 6,041 psi, Qmax: 59.9 bpm, Pmax: 7,307 psi.

Load to recover for this stage: 5,828 bbls.
Total load to recover: 17,626 bbls.

RIH & set Stage 5 CBP at 11,230'. Perforated: 11,176'-11,180'; 11,137'-11,141'; 11,086'-11,090'; 11,032'-11,036'; 10,997'-11,001'. All shots fired.

Stage 5:

SICP: 1,753 psi. Formation broke at 4,715 psi while pumping @ 4.2 bpm. Fractured zone by pumping 94 bbls of 15% HCL acid, 1,363 bbls Slickwater, 546 bbls of 8# linear gel, 868 bbls of 10# XLink gel, 1,405 bbls of 12# XLink gel, 7,245# of 100 mesh sand, & 88,160# of 30/50 MG Lite. Proppant pumped this stage: 97,750#. Total proppant pumped: 381,792#. ISIP 3,711 psi with a frac gradient of 0.767 psi/ft. Qavg: 65.8 bpm, Pavg: 5,866 psi, Qmax: 69.5 bpm, Pmax: 6,219 psi.

Load to recover for this stage: 4,276 bbls.
Total load to recover: 21,900 bbls.

RIH set Stage 6 CBP at 10,964'. Perforated: 10,919'-10,923'; 10,893'-10,897'; 10,832'-10,836'; 10,736'-10,740'; 10,684'-10,688'. All shots fired.

Stage 6:

SICP: 2,645 psi. Formation broke at 3,521 psi while pumping @ 4.4 bpm. Fractured zone by pumping 94 bbls of 15% HCL acid, 1,447 bbls Slickwater, 731 bbls of 8# linear gel, 3,534 bbls of 10# XLink gel, 7,537# of 100 mesh sand, & 124,516# 30/50 MG Lite. Proppant pumped this stage: 133,908#. Total proppant pumped: 515,700#. ISIP 3,791 psi with a frac gradient of 0.783 psi/ft. Qavg: 66.9 bpm, Pavg: 5,366 psi, Qmax: 69.3 bpm, Pmax: 6,302 psi.

Load to recover for this stage: 5,806 bbls.
Total load to recover: 27,704 bbls.

RIH & set Stage 7 CBP at 10,290'. Perforated: 10,198'-10,203'; 10,154'-10,159'; 10,102'-10,107'; 10,046'-10,051'. All shots fired.

Stage 7:

SICP: 3,312 psi. Formation broke at 6,681 psi while pumping @ 3.8 bpm. Fractured zone by pumping 94 bbls of 15% HCL acid, 1,464 bbls Slickwater, 375 bbls of 8# linear gel, 2,007 bbls of 10# XLink gel, 7,076# of 100 mesh sand, 124,454# of 30/50 Ottawa, & 30,827# of 30/50 Garnet. Proppant pumped this stage: 164,697#. Total proppant pumped: 680,397#. ISIP 3,173 psi with a frac gradient of 0.746 psi/ft. Qavg: 67.7 bpm, Pavg: 4,231 psi, Qmax: 69.5 bpm, Pmax: 4,551 psi.

Load to recover for this stage: 3,940 bbls.
Total load to recover: 31,636 bbls.

RIH & set Stage 8 CBP at 10,010'. Perforated: 9,966'-9,970'; 9,904'-9,908'; 9,867'-9,871'; 9,826'-9,830'; 9,806'-9,808'. All shots fired.

Stage 8:

SICP: 2,357 psi. Formation broke at 4,132 psi while pumping @ 3.6 bpm. Fractured zone by pumping 102 bbls of 15% HCL acid, 1,705 bbls Slickwater, 326 bbls of 8# linear gel, 2,349 bbls of 10# XLink gel, 6,063# of 100 mesh sand, 139,703# of 30/50 Ottawa, & 31,670# 30/50 Garnet. Proppant pumped this stage: 180,256#. Total proppant pumped: 860,653#. ISIP 1,943 psi with a frac gradient of 0.629 psi/ft. Qavg: 67.9 bpm, Pavg: 4,520 psi, Qmax: 71.9 bpm, Pmax: 4,944 psi.

Load to recover for this stage: 4,482 bbls.
Total load to recover: 36,110 bbls.

RIH & set Stage 9 CBP at 9,740'. Perforated: 9,698'-9,708'; 9,620'-9,625'; 9,536'-9,541'. All shots fired.

Stage 9:

SICP: 732 psi. Formation broke at 823 psi while pumping @ 3.5 bpm. Fractured zone by pumping 88 bbls of 15% HCL acid, 1,078 bbls Slickwater, 201 bbls of 8# linear gel, 1,553 bbls of 12# XLink gel, 5,962# of 100 mesh sand, 103,262# 20/40 Brady, & 22,511# 20/40 Garnet. Proppant pumped this stage: 133,476#. Total proppant pumped: 994,129#. ISIP 2,188 psi with a frac gradient of 0.66 psi/ft. Qavg: 49.6 bpm, Pavg: 2,922 psi, Qmax: 50.2 bpm, Pmax: 3,656 psi.

Load to recover for this stage: 2,920 bbls.
Total load to recover: 39,026 bbls.

RIH & set Stage 10 CBP at 9,500'. Perforated: 9,450'-9,460', 9,368'-9,378'. All shots fired.

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Stage 10:

SICP: 1,501 psi. Formation broke at 1,599 psi, while pumping 3 bpm. Fractured zone by pumping 73 bbls 15% HCL acid, 890 bbls Slickwater, 190 bbls of 8# linear gel, 1,491 bbls of 12# XLink gel, 4,585# of 100 mesh sand, 105,832# of 20/40 Brady, & 22,925# of 20/40 Garnet: Proppant pumped this stage: 134,392#. Total proppant pumped: 1,128,52#. ISIP 1,576 psi with a frac gradient of 0.6 psi/ft. Qavg: 59.9 bpm, Pavg: 3,161 psi, Qmax: 61.5 bpm, Pmax: 3,764 psi.

Load to recover for this stage: 2,644 bbls

Total load to recover: 41,667 bbls.

RIH & set Stage 11 CBP @ 9320'. Plug set but did not release from perf gun. Pressured up on plug to 4500 psi. Plug held. Shot btm set of perms from 9,304'-9,309' in an attempt to free gun. Would not release from plug. Worked wireline & eventually pulled out of rope socket. Will retrieve perf gun during drill out operations.

RIH with 2nd perf gun & perforated: 9,258'-9,263', 9,179'-9,184', 9,085'-9,090', 8,928'-8,933'. All shots fired.

Stage 11:

SICP: 223 psi. Formation broke at 1,234 psi while pumping @ 2.9 bpm. Fractured zone by pumping 70 bbls 15% HCL acid, 881 bbls Slickwater, 249 bbls of 8# linear gel, 1,895 bbls of 12# XLink gel, 4,542# of 100 mesh sand, 127,98# of 20/40 Brady, & 23,950# of 20/40 Garnet. Proppant pumped this stage: 157,692#. Total proppant pumped: 1,286,213#. ISIP 1,300 psi, with a frac gradient of 0.575 psi/ft. Qavg: 60.6 bpm, Pavg: 2,631 psi, Qmax: 63 bpm, Pmax: 3,405 psi.

Load to recover for this stage: 3,095 bbls.

Total load to recover: 44,756 bbls.

RIH & set Stage 12 CBP at 8,860'. Had to work perf gun loose from plug.

Perforated: 8,780'-8,785', 8,730'-8,735', 8,665'-8,670', 8,573'-8,578'. All shots fired.

When gun was POOH, found mandrel from plug still on plug setting tool. RIH with 2nd CBP & set @ 8,820' on top of original plug @ 8,860'.

Stage 12:

SICP: 445 psi. Formation broke at 875 psi while pumping @ 3.1 bpm. Fractured zone by pumping 94 bbls 15% HCL acid, 1,068 bbls Slickwater, 310 bbls of 8# linear gel, 1,963 bbls of 12# XLink gel, 4,695# of 100 mesh sand, 127,191# of 20/40 Brady, & 25,518# of 20/40 Garnet. Proppant pumped this stage: 160,109#. Total proppant pumped: 1,446,322#. ISIP 1,242 psi, with a frac gradient of 0.575 psi/ft. Qavg: 58.5 bpm, Pavg: 2,180 psi, Qmax: 61 bpm, Pmax: 2,647 psi.

Load to recover for this stage: 3,435 bbls.
Total load to recover: 48,185 bbls.

RIH & set Stage 13 CBP at 8,516'. Perforated: 8,435'-8,439', 8,356'-8,360', 8,290'-8,294', 8,230'-8,234', 8,181'-8,185'. All shots fired.

Stage 13:

SICP: 131 psi. Formation broke at 1,011 psi while pumping @ 3.2 bpm. Fractured zone by pumping 71 bbls 15% HCL acid, 832 bbls Slickwater, 434 bbls of 8# linear gel, 2,338 bbls of 12# XLink Gel, 4,618# of 100 mesh sand, 117,951# of 20/40 Brady, & 23,722# of 20/40 Garnet. Proppant pumped this stage: 149,270#. Total proppant pumped: 1,595,592#. ISIP 1,308 psi, with a frac gradient of 0.59 psi/ft. Qavg: 67.5 bpm, Pavg: 2,504 psi, Qmax: 71.2 bpm, Pmax: 3,168 psi.

Load to recover for this stage: 3,675 bbls.
Total load to recover: **51,852** bbls.

RIH & set cap plug @ 7,500'. Pulled up and negative tested plug. Held good. SI well & RDMO wireline company equipment & frac company equipment.

