

Adam Johnson

From: Bob Koehler - DNR <bob.koehler@state.co.us>
Sent: Wednesday, April 04, 2018 11:53 AM
To: Adam Johnson
Subject: RE: Pressure Calculations

Phew! Glad it all worked out OK. Didn't want you to have to juggle the MIT. Hope the pressures really are OK.

Cheers,

Robert P. (Bob) Koehler, PhD.
UIC Lead – Geology Advisor

Phone: 303-894-2100 x5147

Email: Bob.Koehler@state.co.us



From: Adam Johnson <ajohnson@foundationenergy.com>
Sent: Wednesday, April 4, 2018 9:30 AM
To: Bob Koehler - DNR <bob.koehler@state.co.us>
Subject: RE: Pressure Calculations

Yeah 3,800 psi will work for us.

We will change the max gas/water injection pressures on the form 31 to:

Water – 1,684 psi
Gas – 3,801 psi

We will not perform a step rate test. We will plan to MIT the well tomorrow.

From: Bob Koehler - DNR <bob.koehler@state.co.us>
Sent: Tuesday, April 03, 2018 4:40 PM
To: Adam Johnson <ajohnson@foundationenergy.com>
Subject: FW: Pressure Calculations

Adam,

Edith Difima, one of our integrity engineers took your Maximum GAS Surface Injection Pressure calculation and reworked it a little. Here is what she came up with. Will a Maximum Gas Surface Injection Pressure of 3800 psi work for you?

Cheers,

Robert P. (Bob) Koehler, PhD.
UIC Lead – Geology Advisor

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From: Difima - DNR, Edith <edith.difima@state.co.us>

Sent: Tuesday, April 3, 2018 2:43 PM

To: Bob Koehler - DNR <bob.koehler@state.co.us>

Subject: Pressure Calculations

Fracture gradient - 0.7168 psi/ft

Temperature gradient - 1.5°F/100ft

Depth- Tubing- 6592 ft.

Bottom String Pressure - $6592\text{ft} \times 0.7168 = 4725$ psi

Surface Pressure - 3802 psi

Density gas at average conditions in tubing string (4263 psi, 117.5 F) = 20.204 lb/ft³ = 0.14019 psi/ft.
Found using gas properties attached and online natural gas density calculator.

$0.14019 \text{ psi/ft} \times 6592 \text{ ft} = 924$ psi

$4725 \text{ psi} - 924 \text{ psi} = \mathbf{3801 \text{ psi Surface pressure}}$

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Edith Difima

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