FRACTURE GRADIENT AND MAXIMUM INJECTION PRESSURE

INJECTOR 1

Fracture Gradient

In the project AoR there is no site-specific [redacted] fracture pressure or fracture gradient. [redacted] step rate test will be conducted as per the preoperational testing plan. However, several wells have formation integrity tests (FIT) for shallower formations [redacted]. A FIT performed in [redacted] recorded a minimum fracture gradient of 0.809 psi/ft. Four other wells [redacted] recorded minimum fracture gradients of 0.75-0.76 psi/ft based on FIT [redacted]). FIT data for three other wells across the Sacramento basin at depths between [redacted] averaged 0.84 psi/ft ([redacted]). See Figure 2.5-4 for location of all wells. [redacted] was operated at 0.8psi/ft.

For computational modeling, a frac gradient of 0.7 psi/ft was used, which should be below the actual frac gradient assuming [redacted] frac gradient would be similar to shallower zones.

Maximum Injection Pressure

CTV will ensure that the injection pressure is beneath 90% of the fracture gradient at the top of perforations in the injection wells. CTV expects to operate the wells with a planned bottom hole injection pressure well below the maximum allowable injection pressure calculated using the fracture gradient and safety factor.

Table 1 – Fracture gradient and maximum allowable pressure for Injector 1

Injection Pressure Details	**Injection Well 1** [redacted]
Fracture gradient (psi/ft)	0.70
Maximum allowable bottomhole injection pressure (90% of fracture pressure) (psi)	6,021
Elevation corresponding to maximum injection pressure (ft TVD)	9,557
Elevation at the top of the perforated interval (ft TVD)	9,557