

TLS Report PNR1z

Author	Senior Geoscientist	File Name:	TLS_report_trailing event_271018_PNR1z
Approver:	Senior Geoscientist	Version No:	1
Reviewer:	HSE&P Manager, Frac Manager, Technical Director	Date of Issue:	28/10/2018
		Proposed date of Review:	n/a

Version	Section	Revision Information	Date	Reviser
1.0	All	Final Publication		Senior Geoscientist

Documents are reviewed as per proposed review date, or sooner if a significant change to the operation has taken place, to ensure relevance to the systems and process that they define.

Event Summary

After injection operations of stage 31 for the hydraulic stimulation of PNR1z, a seismicity related traffic light system trailing event threshold was exceeded. The seismic event had a local magnitude of 0.78 ML. The seismic event hypocenter shown in the map and x-section by the blue dot, was roughly 502 m from the injection point.

Event Classification

Green Event	Amber Light	Red Light	Trailing Event (<=0.5ML)	Trailing Event (>0.5ML)
				X

Event Details

Magnitude (ML)	Date	Time (24hr) BST	Last Stage Injection
0.78	27/10/2018	11:55:25	31

Hypocenter Information

X [mEast] BNG	Y [mNorth] BNG	Z [mTVDGL]	Distance to Nearest Injection Point (m)
336496	433107	-2300	502

Error / Uncertainties

P Trace Quality	S Trace Quality	Trace Quality	Min Ellipsoid size (m)	Mid Ellipsoid size (m)	Max Ellipsoid size (m)
0.84	0.65	0.56	203	281	721

Ground Motion & Well Integrity

Max PPV (mm/sec)	Average PPV (mm/sec)	Fit to GMPE (mm/sec)	Annular Pressure Change (psi)
0.5	0.11	0.4	0

Injection Information

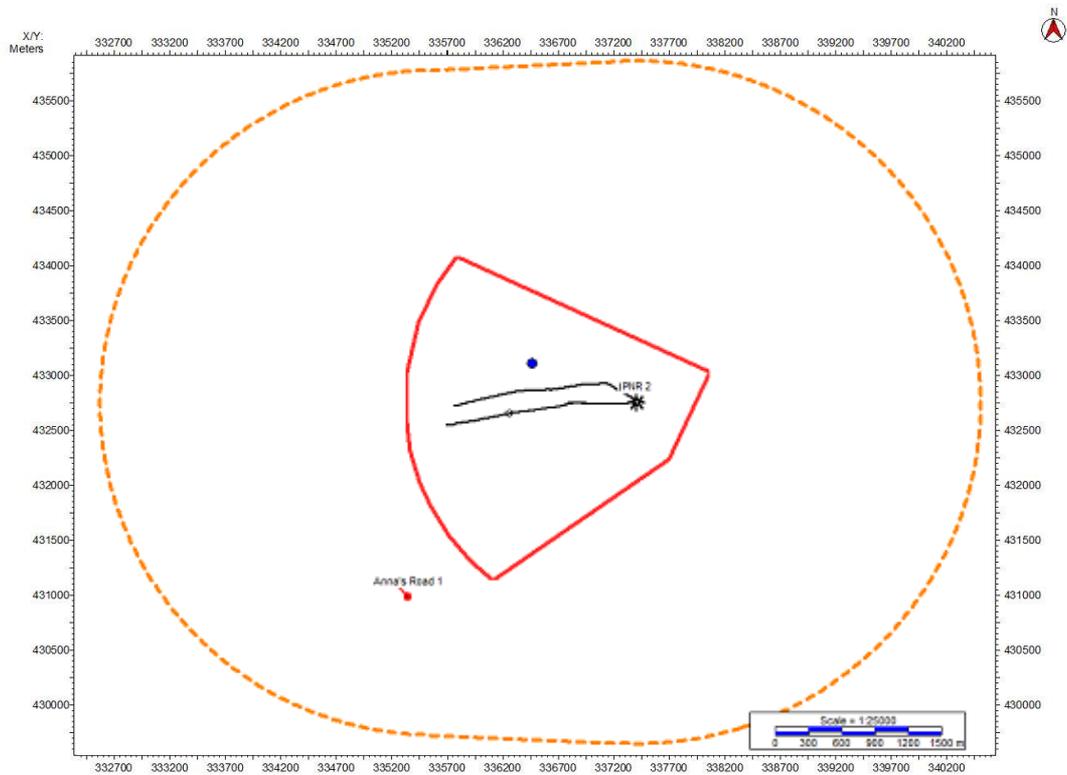
Sleeve	Fluid Volume Injected (m ³)	Proppant Volume Injected (tonnes)	Average Rate (m ³ /min)	Max Treatment Pressure (surface) (bar)	Average Treatment Pressure (surface) (bar)
31	112	2.4	3.9	430	371

Stage (cumulative)	Fluid Volume Injected (m ³) (cumulative)	Proppant Volume Injected (tonnes) (cumulative)	Flow Back (m ³) (cumulative)
10	2313	139	229

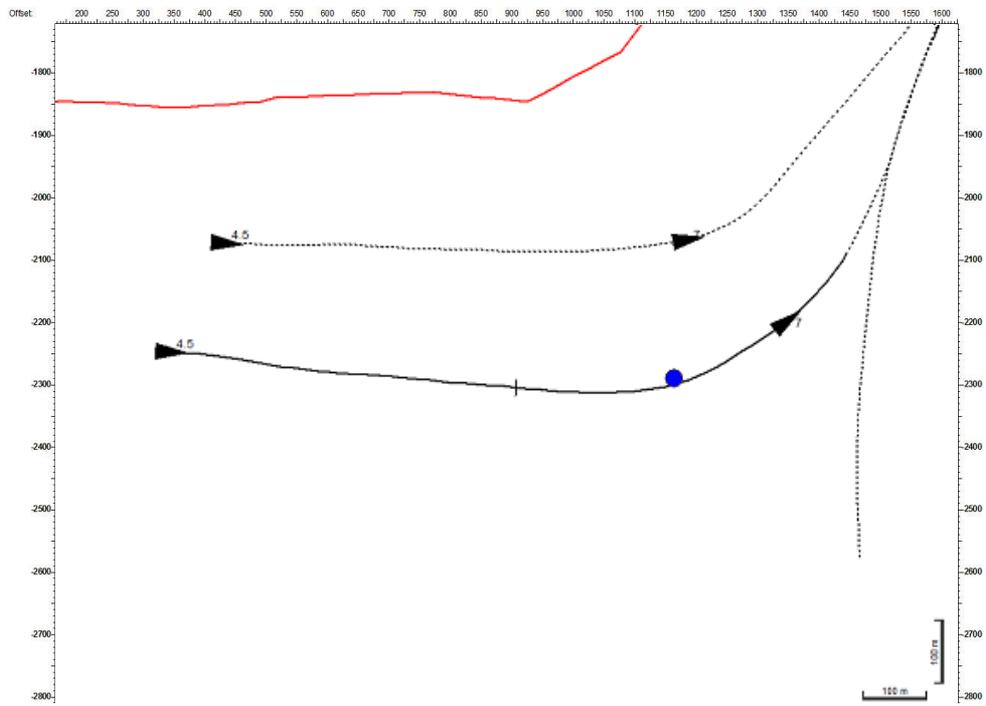
Forward Injection Schedule / Additional Mitigation

Waiting Time (hr) (<0.0ML)	Next Stage	Proposed Volume (m ³)	Mini Frac	Additional Mitigation
-	-	-	Yes/no	

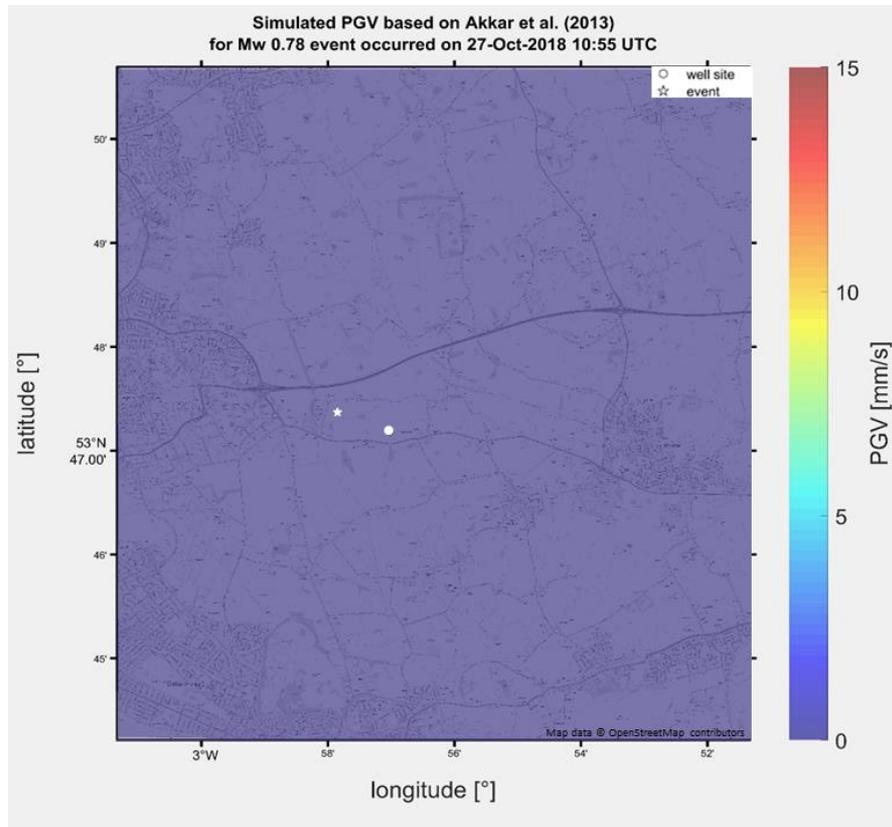
Base Map



Cross Section



Shake Map



The location of the sensor sites has been redacted on the basis of commercial confidentiality and public safety

Attenuation Curve

