

TLS Report PNR1z

Management System:	HSE	File Name:	TLS_Trailing_Event_Final_report_04.11.2018_PNR1z	
Approver:	Senior Geoscientist	Version No:	1	
Reviewer:	HSE&P Manager, Frac Manager, Technical Director	Date of Issue:		
		Proposed date of Review:	n/a	
Version	Section	Revision Information	Date	Reviser
0.1	All	Draft Publication		Senior Geoscientist
<p><i>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.</i></p>				

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Event Summary

After the injection operations of sleeve 35 for the hydraulic stimulation of PNR1z, a seismicity related traffic light system trailing event >0.5 threshold was exceeded. The seismic event had a local magnitude of 0.66 ML. The seismic event hypocenter shown in the map and x-section by the blue dot, was roughly 481 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 Sleeve Injection
0.66	4/11/2018	16:24:06	35

Hypocenter Information

X [mEast] BNG	Y [mNorth] BNG	Z [mTVDGL]	Distance to Nearest Injection Point (m)
336702	432904	2411	481

Error / Uncertainties

P Trace Quality	S Trace Quality	Trace Quality	Min Ellipsoid size (m)	Mid Ellipsoid size (m)	Max Ellipsoid size (m)
0.84	0.45	0.36	192.9	231.2	597.6

Downhole Hypocenter Information

X [mEast] BNG	Y [mNorth] BNG	Z [mTVDGL]	Distance to Nearest Injection Point (m)
336448	432740	2264	135.9

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Ground Motion & Well Integrity

Max PPV (mm/sec)	Average PPV (mm/sec)	Fit to GMPE (mm/sec)	Annular Pressure Change (psi)
0.42	0.11	0.3	0

Injection Information

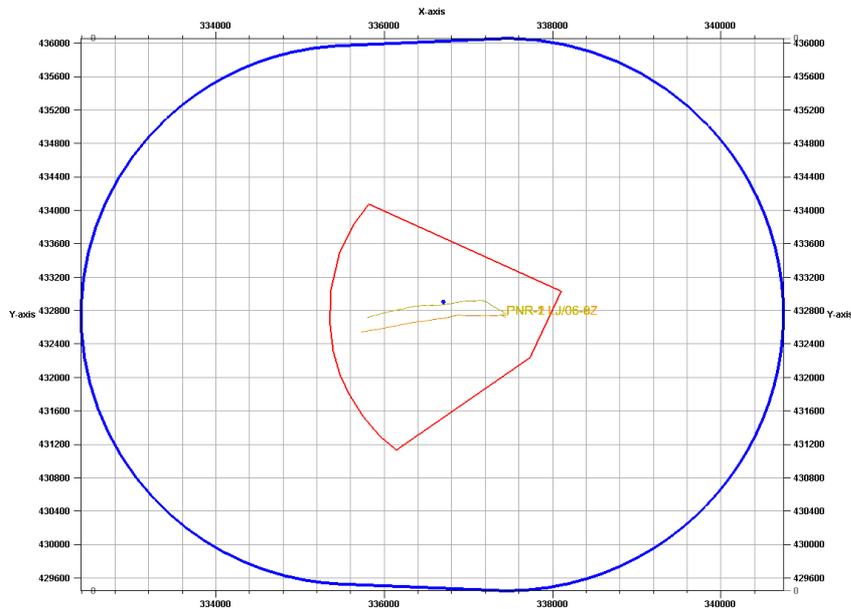
Sleeve	Fluid Volume Injected (m ³)	Proppant Volume Injected (tonnes)	Average Rate (m ³ /min)	Max Treatment Pressure (surface) (bar)	Average Treatment Pressure (surface) (bar)
35	14.25	0	2.19	587	512

Stage (cumulative)	Fluid Volume Injected (m ³) (cumulative)	Proppant Volume Injected (tonnes) (cumulative)	Flow Back (m ³) (cumulative)
17	2482.05	146.4	297.45

Forward Injection Schedule / Additional Mitigation

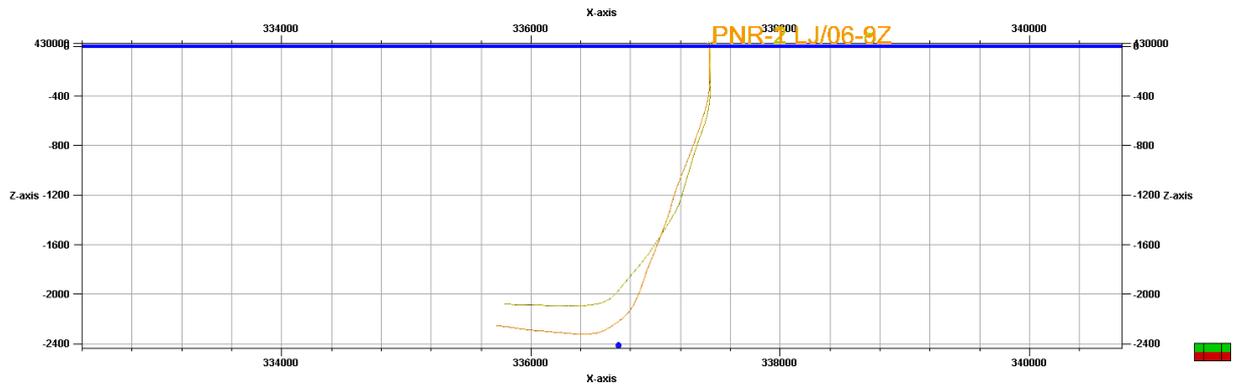
Waiting Time (hr) (<0.0ML)	Next Stage	Proposed Volume (m ³)	Mini Frac	Additional Mitigation
-	-	-	Yes/no	

Base Map

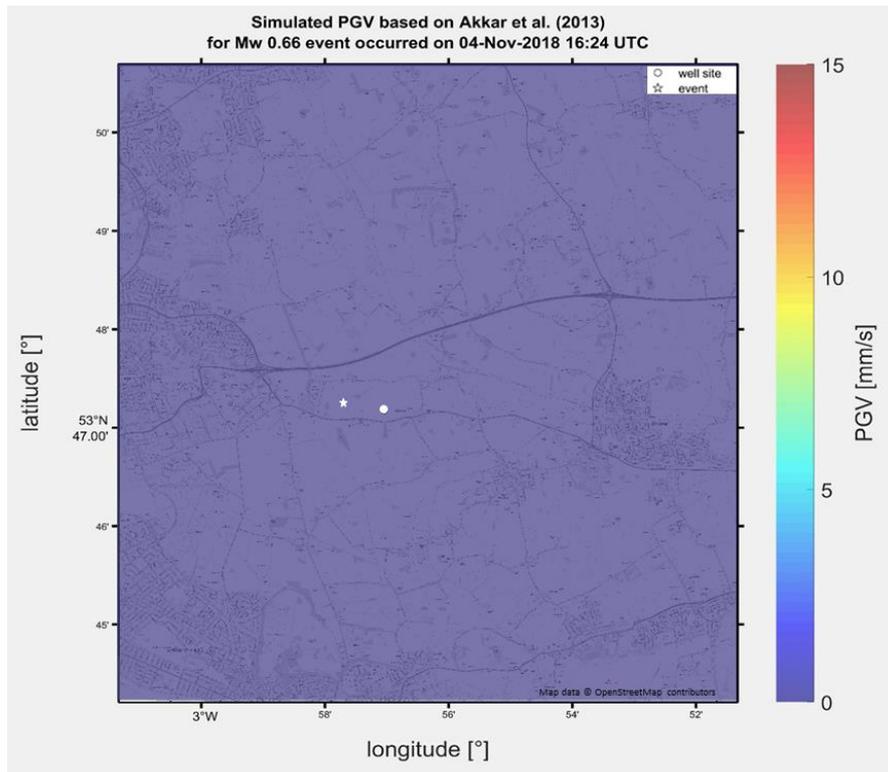


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Cross Section (From South)



Shake Map



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

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Attenuation Curve

