

Squid: An innovative, new ground-coupled electric seismic source for semi-continuous seismic monitoring

Don Lawton^{1,2}, Trent Hunter³, Brendan Kolkman-Quin¹, Malcolm Bertram^{1,2}, Greg Maidment²

¹CREWES, University of Calgary, ²CMC Research Institutes Inc, ³3P Technologies Corp.

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Land seismic sources – monitoring challenges



CaMI.FRS layout with permanent seismic source



3

GPUSA helical pile installation: 24.7 m deep





GPUSA helical pile installation: 24.7 m deep







3P Technology 'Squid' electric seismic source



Energy is generated by a fluid phase change in the reactor

Static images of the evolving phase change in the reactor.



- Within 2 µsec a 260 MPa pressure pulse is initiated at 70k Kelvin.
- Peak volume of the phase change is 10⁰ litres in 100 msec.
- Indicated peak output power is over 100 MWatts.
- Duration of the impulse lasts 250 msec.

Squid Phase 1 tests at CaMI.FRS



Single pop on pedestal; 3.6 kJoules



50-pop stack on pedestal; each pop 3.6 kJ



Amplitude spectra Z-component VSP data; Squid source



Envirovibe VSP record: 10-150 Hz sweep



Up-going P-wavefield, Squid source



Up-going P-wavefield, Envirovibe source



Pre-stack VSP ensembles



VSP stacks – Squid and Envirovibe









- The Squid is an effective surface seismic source leveraging the dynamics of plasma discharge.
- Fully electric, fast repeating impulse generator.
- Impulse reaction time spans µsec to msec.
- Initial field trials shows very repeatable signal.
- Effective energy coupling to the earth through the base of pedestal.
- High amplitude broad frequency range 10-200 Hz
- Easily configured for autonomous permanent installations for 4D seismic applications.
- Next steps: Phase 2 higher energy levels (10 kJ)
 - recording into surface geophone array
 - DAS recording into Obs wells 1 and 2.

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