

## Case Study

Crescent Point Energy Corp. activates and stimulates a five-stage toe initiation cluster with Interra Energy's Howitzer™ Toe Sleeve system.



### Background

On a typical **Plug & Perf** or **Ball Drop** completion, it is necessary to establish communication between the toe portion of a horizontal wellbore and the formation. This creates an injection point or a channel to the formation while conveying perforating guns or balls on the first stage of the stimulation process.

The most common practices that operators will utilize to establish injection into the toe are the use of E-coil perforating, tractor conveyed perforating, or the operation of a pressure activated toe sleeve. In all these events the operator establishes communication with the formation allowing the normal stimulation process to commence.

*Note: with toe port activations in limited entry applications, most operators will pump down an additional set of perforating guns to establish a greater flow area for stimulating.*

### Challenges

The challenges with E-coil and tractor conveyed perforating is time, excessive cost as well as safety considerations. The typical conveyance of guns through either method may take up to 10 hours depending on the rig up time and the total depth of well.

Toe sleeves are a more efficient way of initializing an injection path into the formation but challenged by pressure test capability, limited flow area and restricted inside diameters of the sleeves. Most toe-initiated sleeves systems will only pressure test to 90 – 95% of the toe sleeves activation pressure which must be exceeded to initiate the sleeve at its opening pressure.

Interra Energy's **Howitzer™ Toe Sleeve** system has the ability of pressure testing to the maximum capability of the casing with the sleeve opening upon the release of pressure. This design meets and exceeds any pressure testing requirements set out by U.S. and Canadian energy regulators.

### Challenge

Economics of cluster perforating the first plug & perf interval

- With E-coil and tractor conveyed perforating a casing integrity test can be established however operations can be time consuming and non-economical.
- Typically toe sleeves systems activate on a single stage maximum burst system which doesn't allow operators to test their casing to the maximum value before activation.
- Hydraulically activated toe sleeves are designed such that they cannot open simultaneously. Perforating guns are still required to establish enough flow area to be able to stimulate the first interval with limited entry effect.

### Solution

Interra Howitzer™ Toe Sleeves Engineered for Efficiency and Reliability.

- Pressure test casing to maximum required operating levels prior to stimulation
- Proprietary design features enable simultaneous opening of multiple ports allowing for cluster stimulations to be completed
- Eliminates use of tractors, coiled tubing, perforating and other intervention methods to establish communication prior to commencing stimulation operations
- Fully frac through capable

## Results

In August of 2018, Crescent Point Energy Corp. deployed five **Howitzer™ Toe Sleeves** in one of their East Duvernay wells. The decision was based on higher efficiencies including less services on location which also reduces costs in comparison to other previously mentioned practices.

On August 19th, 2018, Interra Energy’s personnel was requested on location to activate the cluster of five **Howitzer™ Toe Sleeves**. An Initial 20 min low range casing integrity test was performed at 48.4 MPa (7,000 psi). A secondary high range pressure test was performed at 80.4 MPa (11,600 psi) for 15 min. The well pressure was then bled down, successfully initiating all five **Howitzer™ Toe Sleeves** at the same time establishing immediate injection to formation.

In addition, Crescent Point proceeded to successfully stimulate their first interval by fracing through all five **Howitzer™ Toe Sleeves**.

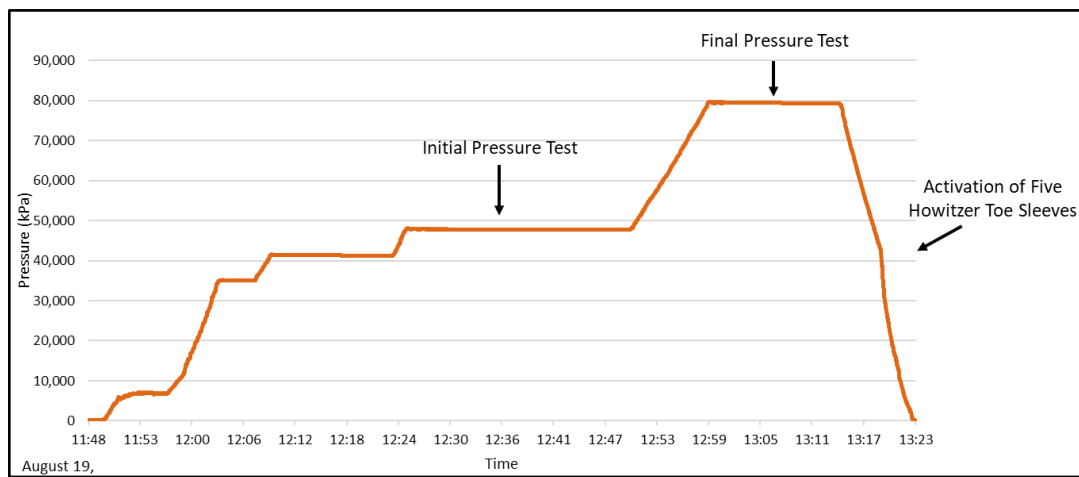


Fig. 1: Pressure chart showing pressure test sequence followed by five **Howitzer™ Toe Sleeve** activations

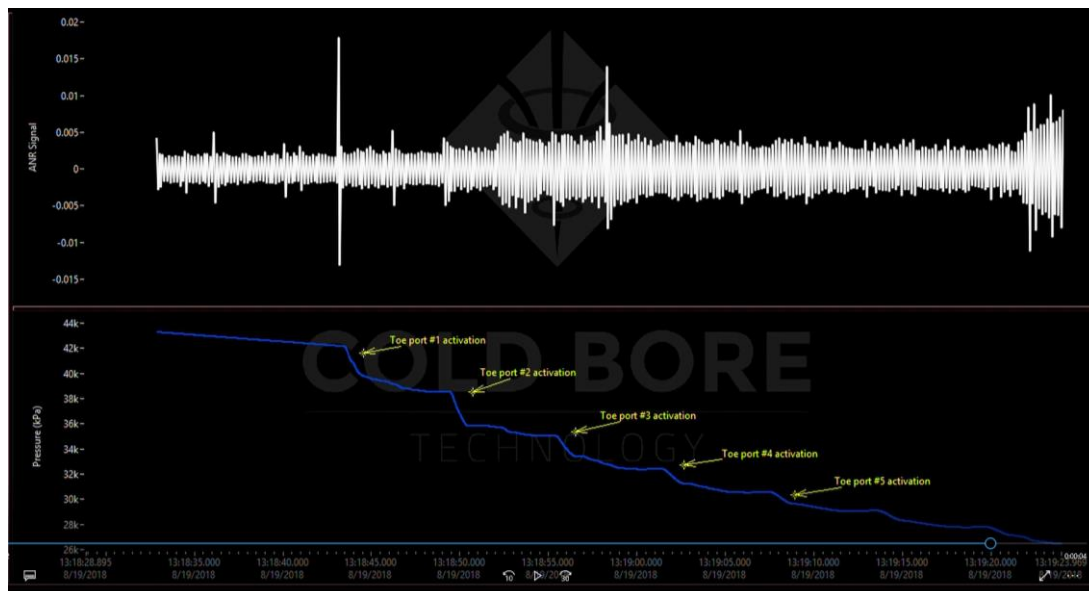


Fig. 2: Screen capture of Cold Bore’s pressure and sound monitoring system confirming signature openings during the **Howitzer™ Toe Sleeve** activation