West Texas Operator Improves Production from San Andres Well with Kraken Perforation/Stimulation Technology

**APPLICATION**  
Reperforation/stimulation (Existing Zone)

**INTERVAL**  
4,770 - 4,850 feet

**FORMATION**  
San Andres (dolomite)

**LOCATION**  
Gaines, Texas

**POROSITY**  
15%

**PERMEABILITY**  
4 md

**SKIN**  
Unknown

**GUN DESIGN**  
3 1/8” Kraken Perf Gun

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**BACKGROUND**

Two cased hole wells initially completed with conventional perf and acid in the San Andres dolomite formation were recompleted with the Kraken and acid in order to improve existing production. The Kraken, a propellant-enhanced perforating gun, is designed to overcome formation damage and improve the performance of the subsequent acid stimulation. A 5000 gallon acid job was run after each Kraken perforating job. The 5000 gallons comprised of 15% HCL split 90% purely acid and 10% with acitol (xylene) for paraffin inhibition. Each acid job was diverted with ~3500 lbs. of rock salt. Both wells saw a consistent increase in production with this enhanced stimulation method. Before and after oil production for both wells is noted in the graph below.

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**Pre-Acid**

- Improve effectiveness of spotting acid
- Break down formation/reduce treating pressure
- Etch channels in newly created fractures

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**Normalized Production: 90 days Pre-Job**
3½" Kraken® Perforating Gun
3.125 in./79mm O.D., 4spf, 60° Spiral System

The Kraken is a propellant enhanced perforating gun designed to overcome the reservoir damaging effects of conventional perforating gun systems. The propellant boosters contained inside the Kraken are based on the same progressively burning propellant technology used in our patented GasGun® stimulation tools. Progressively burning propellants have been proven by independent research to be many times more effective in creating fractures and is the key advantage that sets our tools apart from the competition.

**Benefits**
- Perforates and stimulates the reservoir in one trip.
- Creates multiple radial fractures extending 1-5 feet past the perforation tunnels with the use of progressively burning Kraken propellant boosters.
- Removes skin and cleans up the wellbore damaged by perforators, drilling fines, cement, mud cake, etc.
- Prepares well for hydraulic fracturing by breaking down formation first with the Kraken. Treating pressures are often dramatically reduced, flow rates improved, and the effects of tortuosity minimized.
- Improves effectiveness of acidizing by fracturing first with the Kraken.

**Features**
- The Kraken perforating system is compatible with shaped charges that create a 0.42-inch entrance hole or larger.
- Standard shot density of 4 shots per foot. Customized shot density from 1-4 shots per foot available upon request.
- Standard shot phasing is 60 degrees. Shot phasing can be customized upon request.
- Compatible with simultaneous or select fire systems.
- Conveyance: Wireline, Pump Down, TCP, Coil Tubing, Tractor
- Patent Pending

**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>KRAK-1.7-1.25</th>
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<tbody>
<tr>
<td>Propellant Booster Part Number</td>
<td>KRAK-1.7-1.25</td>
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<tr>
<td>Nominal O.D. (in) [mm]</td>
<td>3.125 [79]</td>
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<tr>
<td>Max Shot Density (spf) [spm]</td>
<td>4 [13]</td>
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<tr>
<td>Max Pressure (psi) [MPa]</td>
<td>20,000 [138]</td>
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<tr>
<td>Max Temp. (°F) [°C]</td>
<td>280 [138]°</td>
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<tr>
<td>Recommended Detonating Cord</td>
<td>80 grains/foot</td>
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<tr>
<td>Typical Gun Swell (in) [mm]</td>
<td>3.48 [88]</td>
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**Warning:** Exceeding the maximum temperature ratings can result in unintentional detonation

* 280°F (138°C) maximum temperature rating is for a 1-hour exposure;
* 260°F (127°C) maximum temperature rating is for a 10-hour exposure.