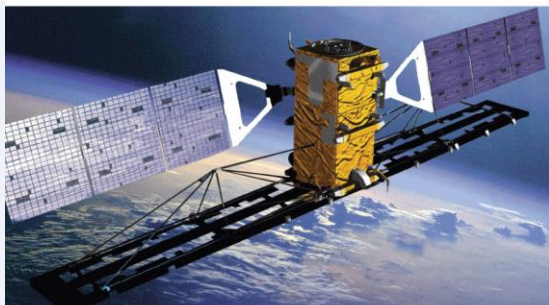




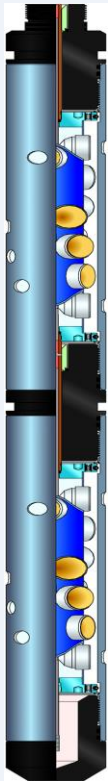
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Who we are ?



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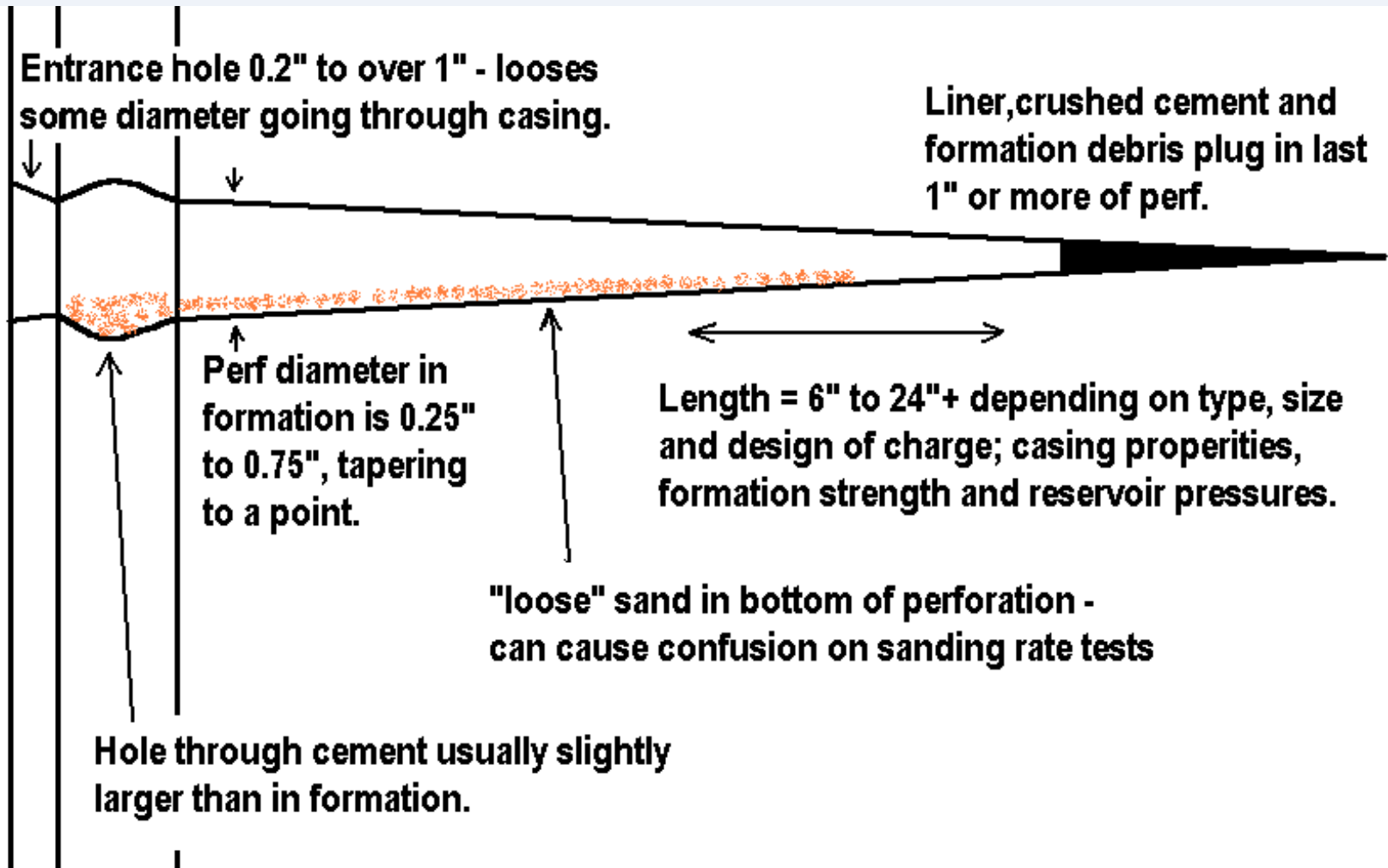


- Using The Gas Gun with Reactive charges,
- A Better passage for the Gas pressure wave

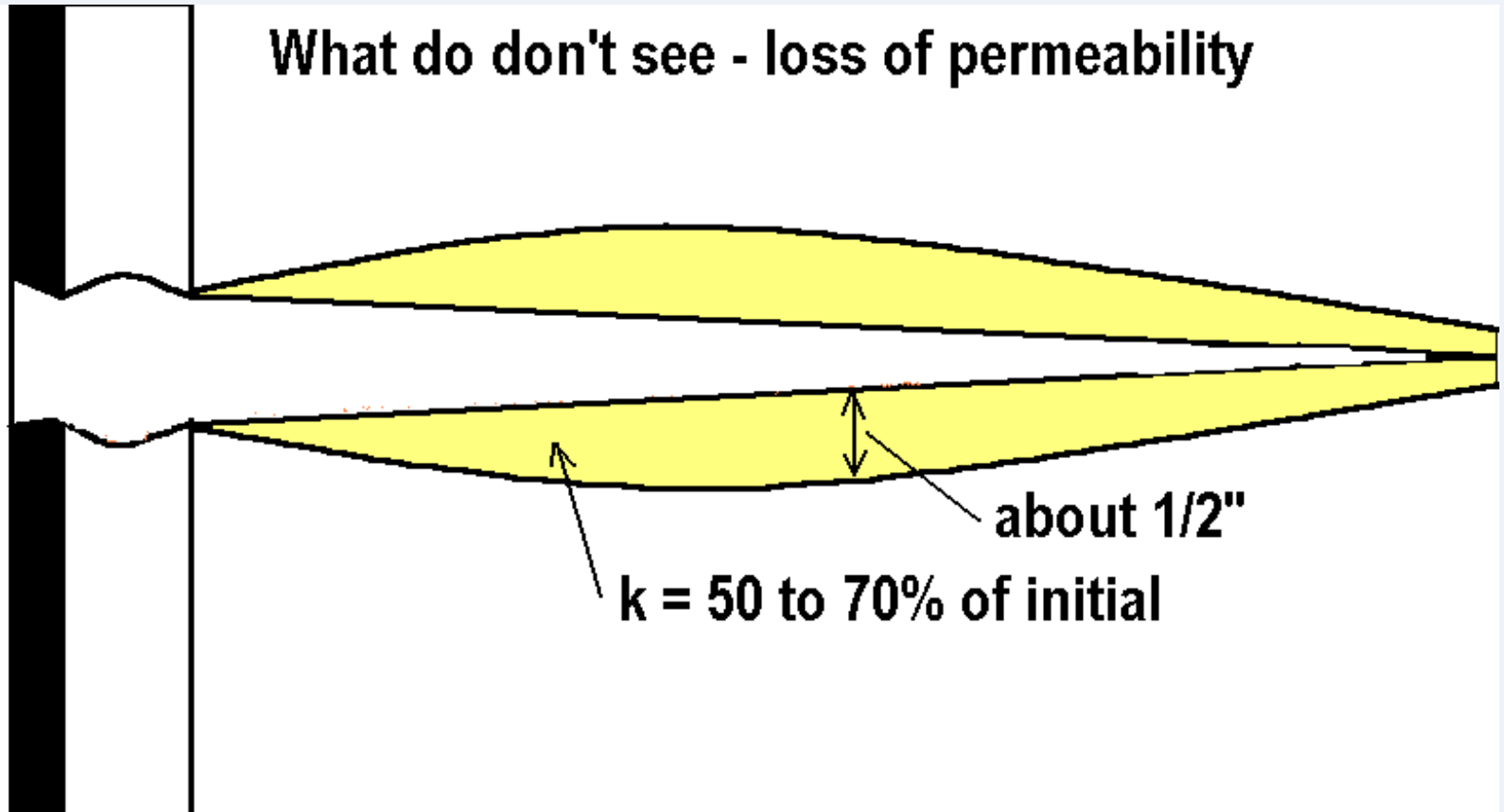
The Challenge: PDS has a case of well located in Red Sea that has a tight reservoir of poor properties. The formation is Nukhul Carbonate with Porosity from 6 - 12 % and Permeability ranges 0.2 - 1 md. randomly. The Reservoir pressure is 1000 psi.



Anatomy of a Perforation



What do don't see - loss of permeability





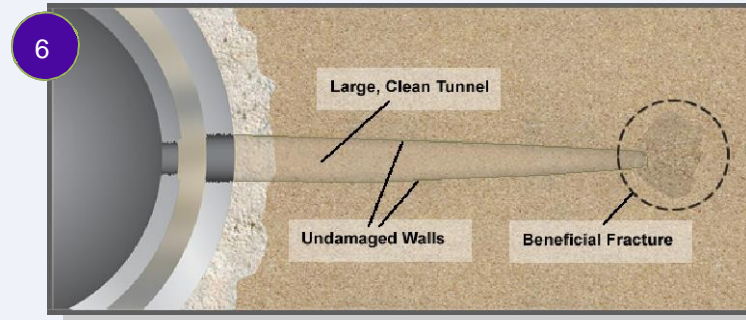
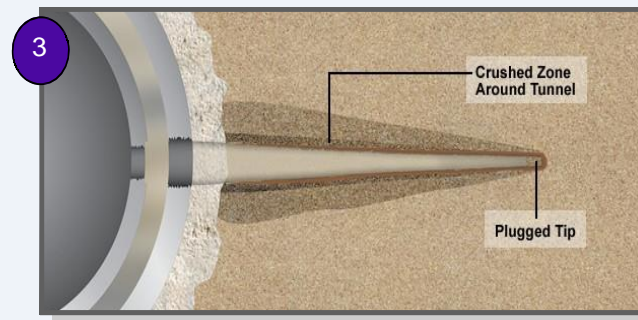
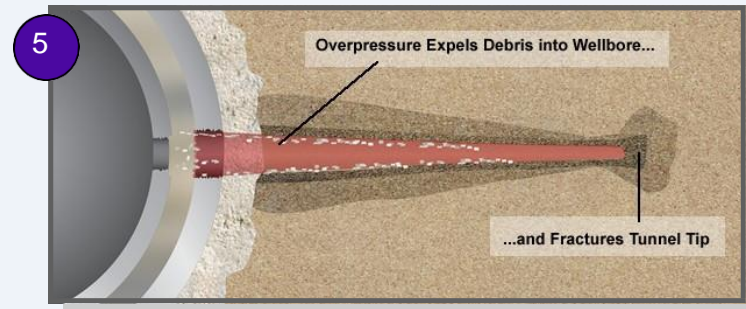
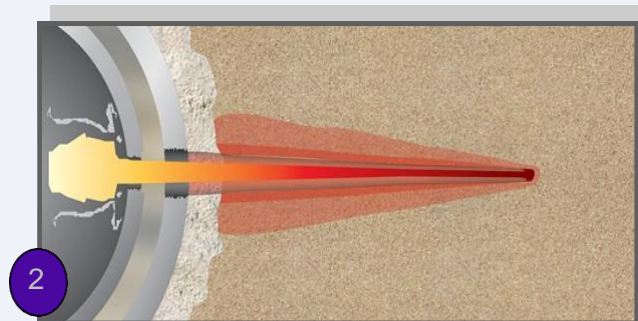
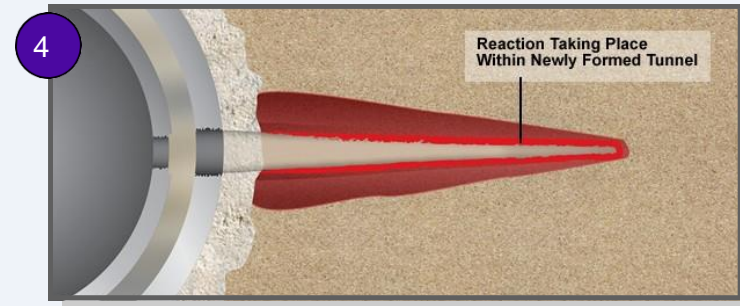
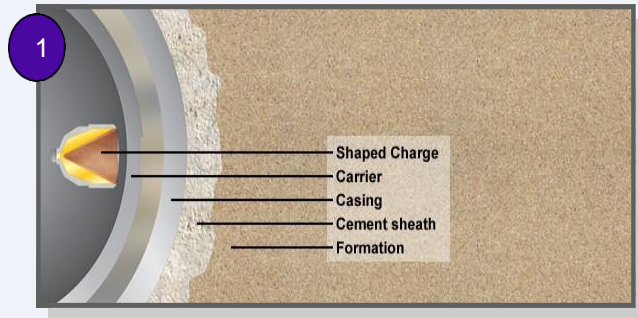
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So The Target is to delivers **Long debris-free** tunnels without depending on underbalance. The result is incredible perforating efficiency, superior productivity, enhanced injectivity, and dramatic improvements in stimulation parameters and performance.

- 1. Reactive Perforating**
- 2. Dynamic Underbalance**
- 3. Gas Gun Fracturing**



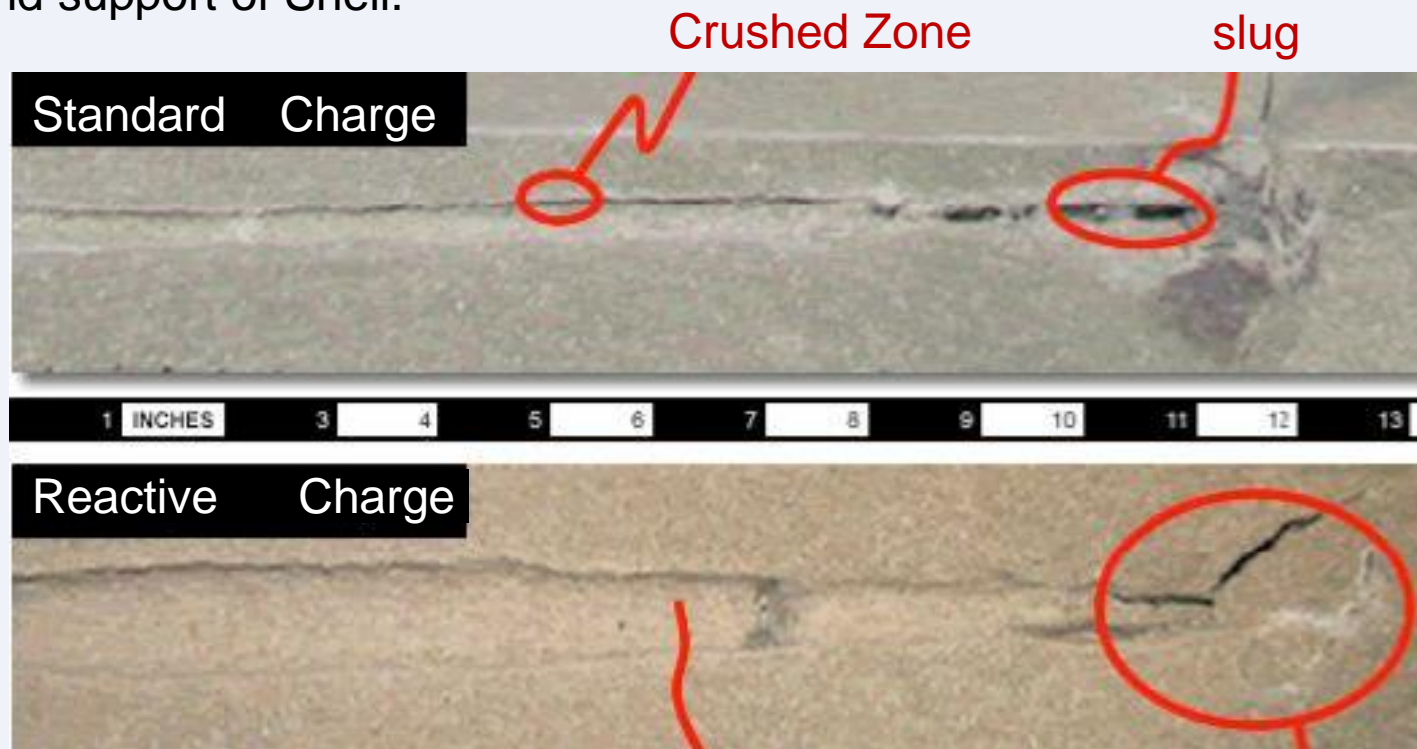
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Reactive Perforating System



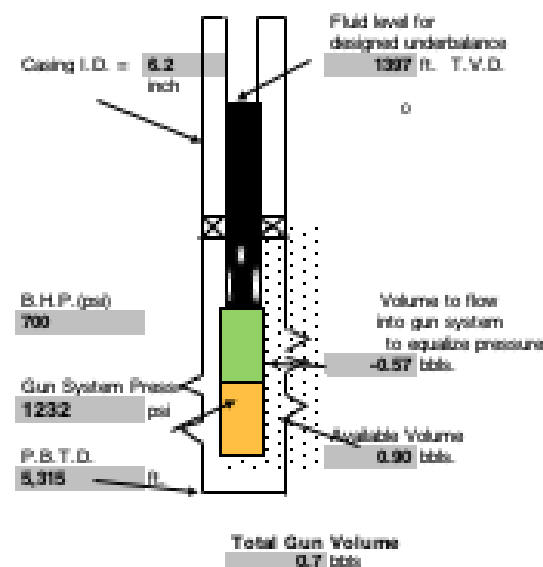
PDS is a main user of the Reactive Perforating System. The new class of Reactive TM shaped charge that delivers a step change improvement in perforation geometry and performance. The Reactive perforating product generates a secondary reaction in the perforation tunnel thanks to proprietary liner metallurgy and charge design. The technology was developed under license from QinetiQ with the vision and support of Shell.



Dynamic Underbalance Calculation Sheet

Well Name =	Bale-118
Company =	GIPC
Casing I.D. =	6.2 inch
Gun Size (O.D. in) =	4.5 inch
Shot Density =	5 S.P.F.
Charge Wt. =	39 gram
Explosives Type =	R.D.X. (or R.D.X., H.M.X., etc...)
Depth of Penetration =	50 inch
Diameter of Perforation =	0.4 inch
Bottom Hole Temp =	152 °F
length of loaded section =	49.21 FT.
length of Blank section =	2.09 FT.
Bottom Hole Pressure =	700 p.s.i.
Fluid Weight =	8.4 A/gal.
Underbalance =	0 p.s.i.
Applied Gas Pressure =	0 p.s.i.
Top Shot @ =	3,000 ft. T.V.D.
P.B.T.D. =	5,315 ft. T.V.D.

Volume Of Perf./ft. =	0.52 U./ft.
Volume of Loaded section V_L =	1.825 U./ft.
Pressure in loaded Section P_L =	1632 p.s.i.
Pressure in loaded Section & Perfs. P_{LP} =	1273 p.s.i.
Volume of Loaded section & Perfs. V_{LP} =	2.340 U./ft.
Pressure in blank section P_B =	14.7 p.s.i.
Total Volume of blank section V_B =	3.9 U.
Pressure in all guns, blanks & perfs. P_{LPB} =	1232 psi
Volume of all guns, blank & perfs. V_{LPB} =	119.1 ft.
=	0.7 bbls
Desired annulus pressure to get proper dp. P_{DA} =	700 p.s.i.
Volume to be filled in guns to reach P_{DA} V_{DA} =	-90.4 ft.
=	-0.57 bbls
Available volume around guns =	0.90 bbls



Summary :-

This case The Formation will be surged to the gun void with underbalance and the volume shown above which might cause sand flow.

$$700 \text{ psi} - 1232 \text{ psi} = -532 \text{ psi}$$

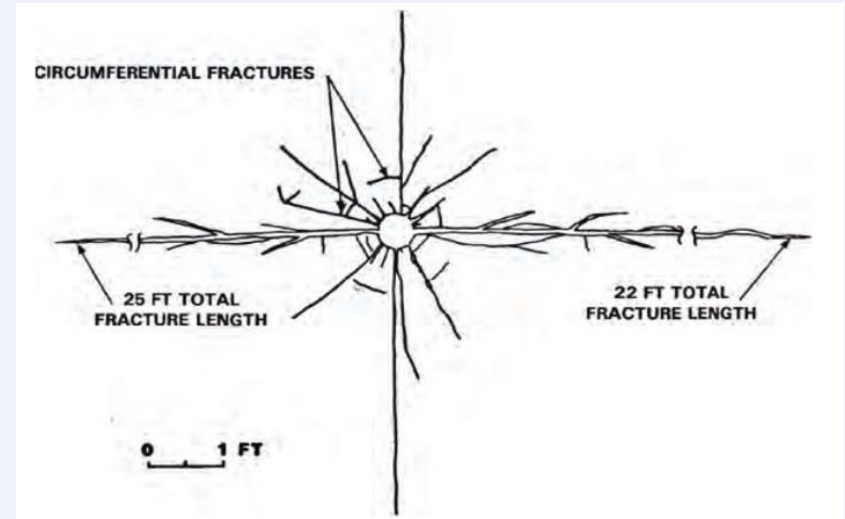
Now, We have ;

1. Deeper initial penetration.
2. More active perforated tunnels.
3. Cleaner tunnel with fracture tips that reduces the breakdown Gas Gun pressure.
4. Improve injection rates at minimum pressure for followed up acidizing job.
5. Ensures reliable fracture initiation and maximum fracture coverage

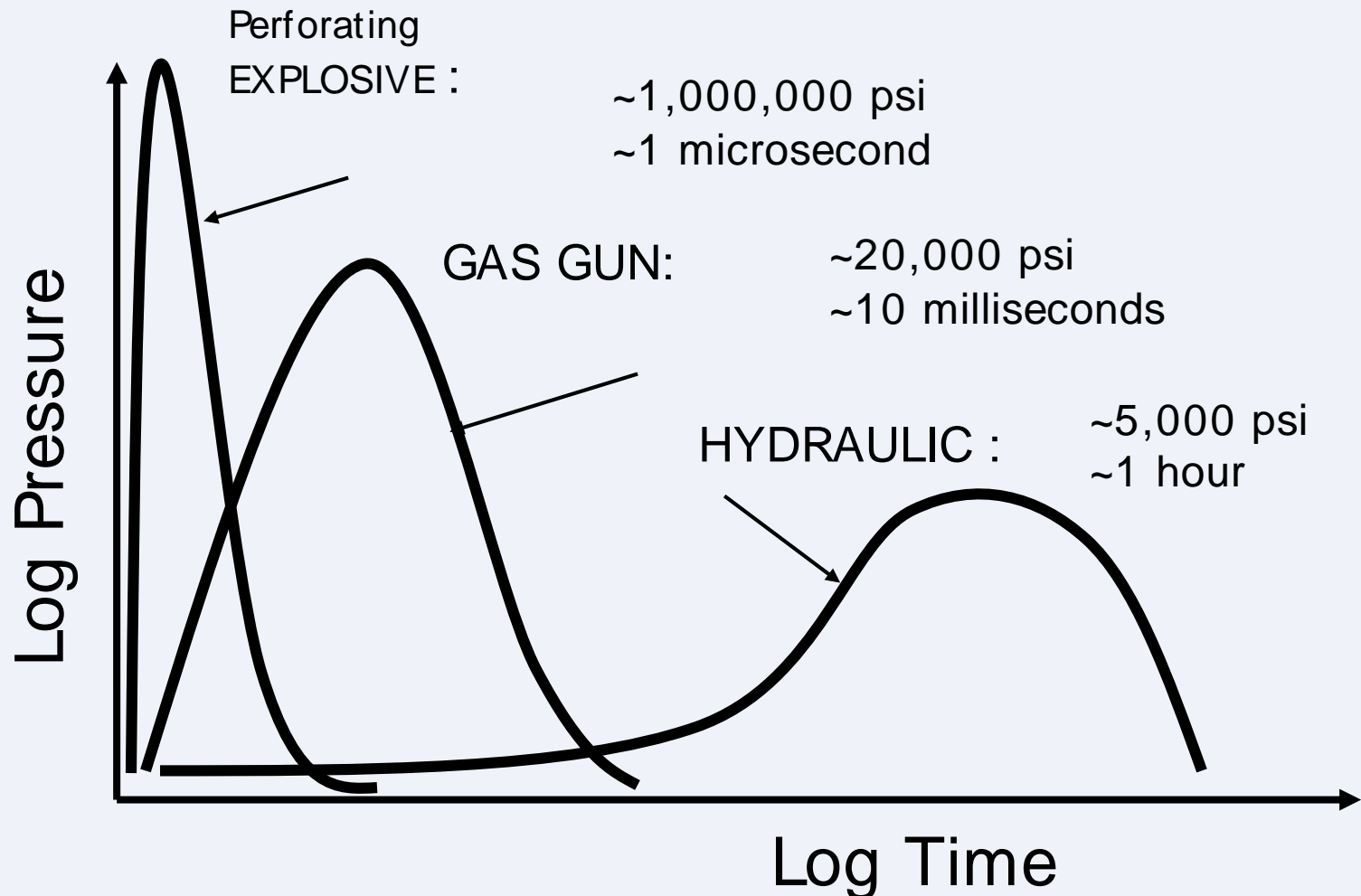


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Utilizing the **Gas Gun**, The extra depth of the perforating tunnels over 20 ft. has tremendously assets the planned acidizing job improving the cleanout treatment process.



The Theory is in the Pressure-time profiles of three stimulation methods





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The **Gas Gun** propellant burning rates and pressure-time profiles are different from explosives and hydraulic fracturing so that it can create multiple fractures that are not governed by in-situ stresses. Hitting the undesired water zone is mostly unlikely.

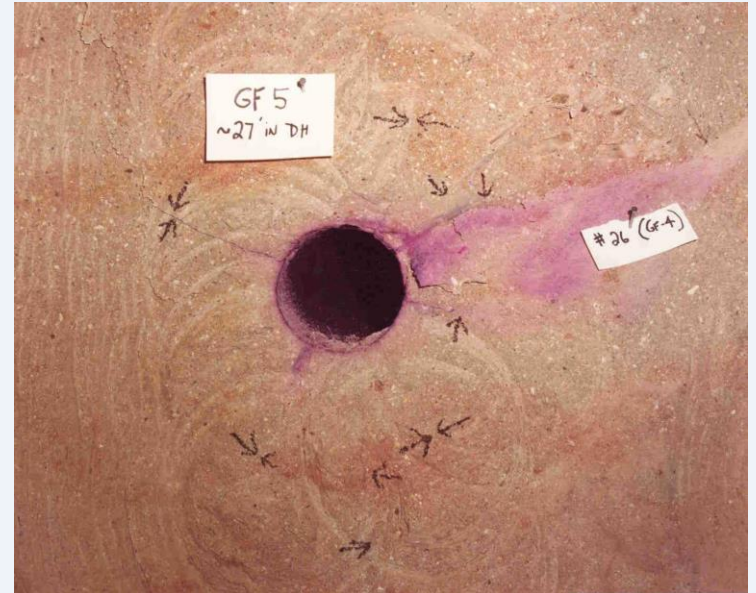




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The Gas Gun



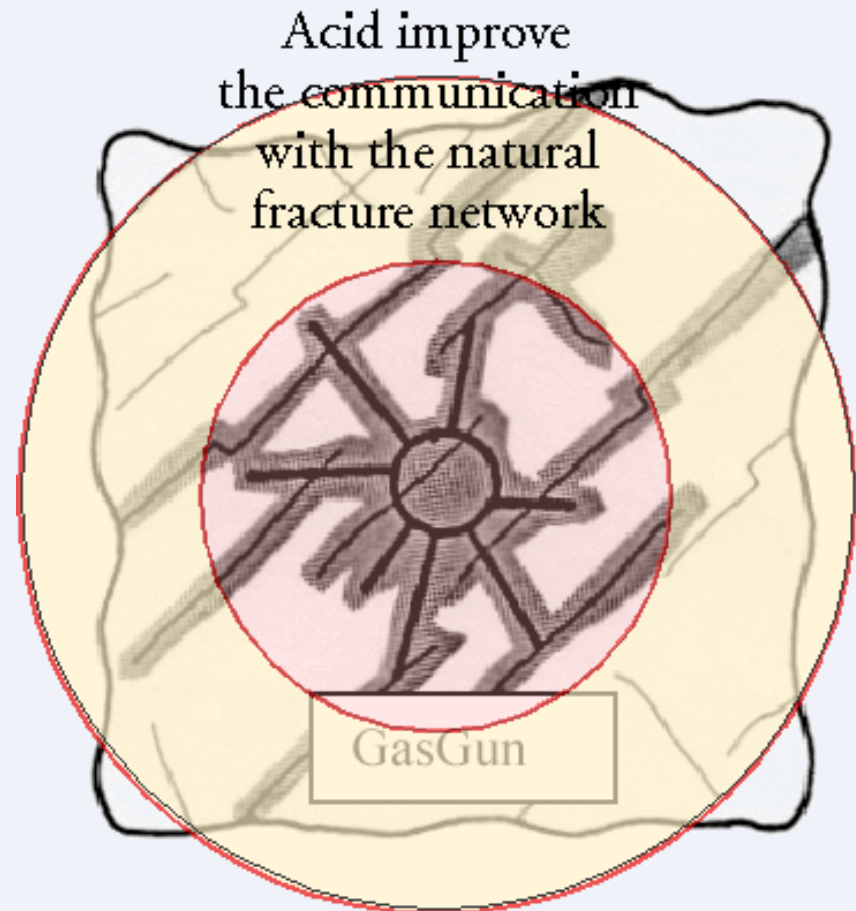
Other



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Now, ready for the Acid Job;

Volume of acid should fill the fracture pattern to a such distance to accommodate a good communication with the well bore.





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Scope Of Services:

1. PERFORATING SERVICES

2. CASED HOLE WIRELINE SERVICES

3. Downhole tools

4. GAS FRACTURING

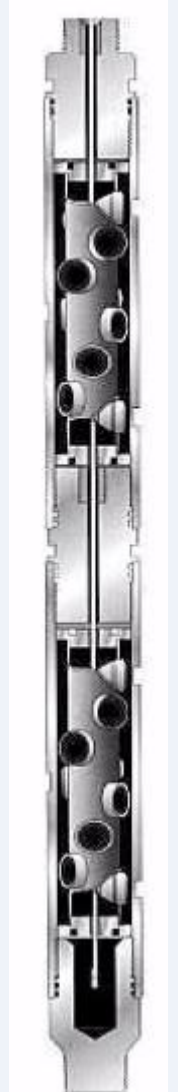
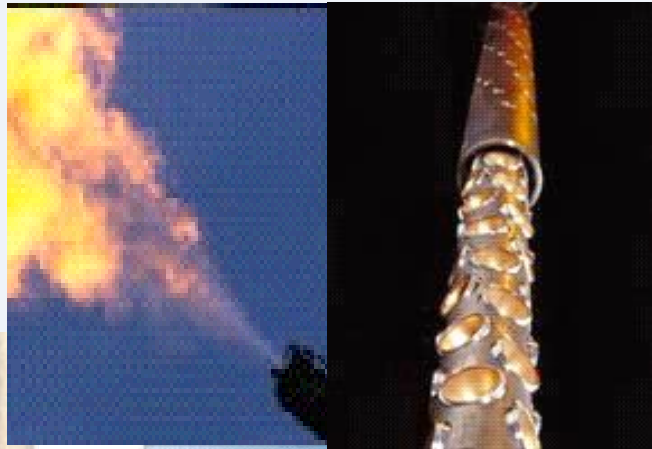
5. ARCASOLVE™ ACIDIZING



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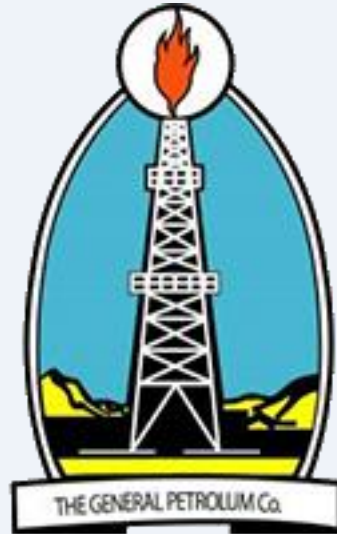
Wadi ELSahl Petroleum Company

Suez Oil Company

Enap Sipetrol



References





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