

Application of Gas Gun in Improving Well Productivity/Injectivity in South Oman Area, a Field Case Study

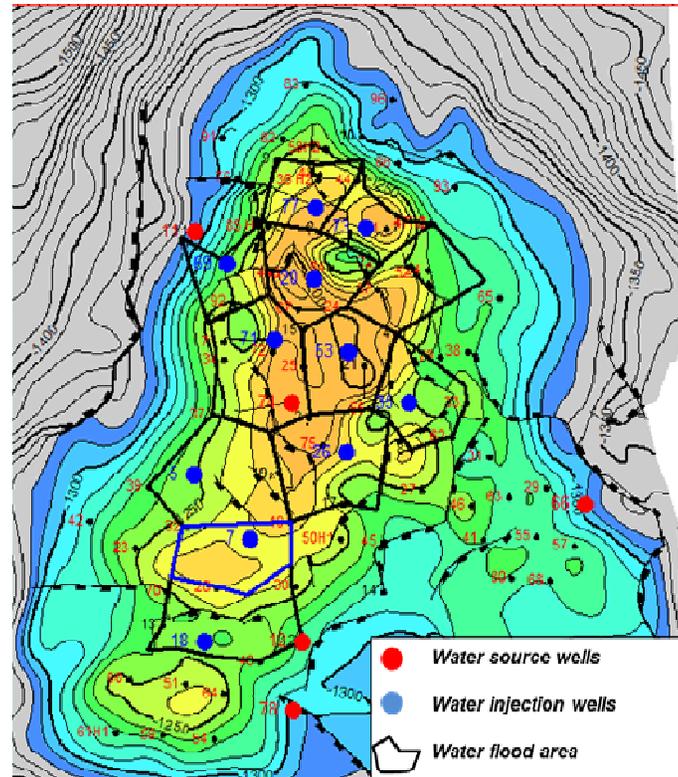
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Outline

- **Background**
- **Challenges**
- **What is the Gas Gun?**
- **The Gas Gun Compared to Hydraulic Fracturing and High Explosive**
- **Outcome**
- **Conclusion**

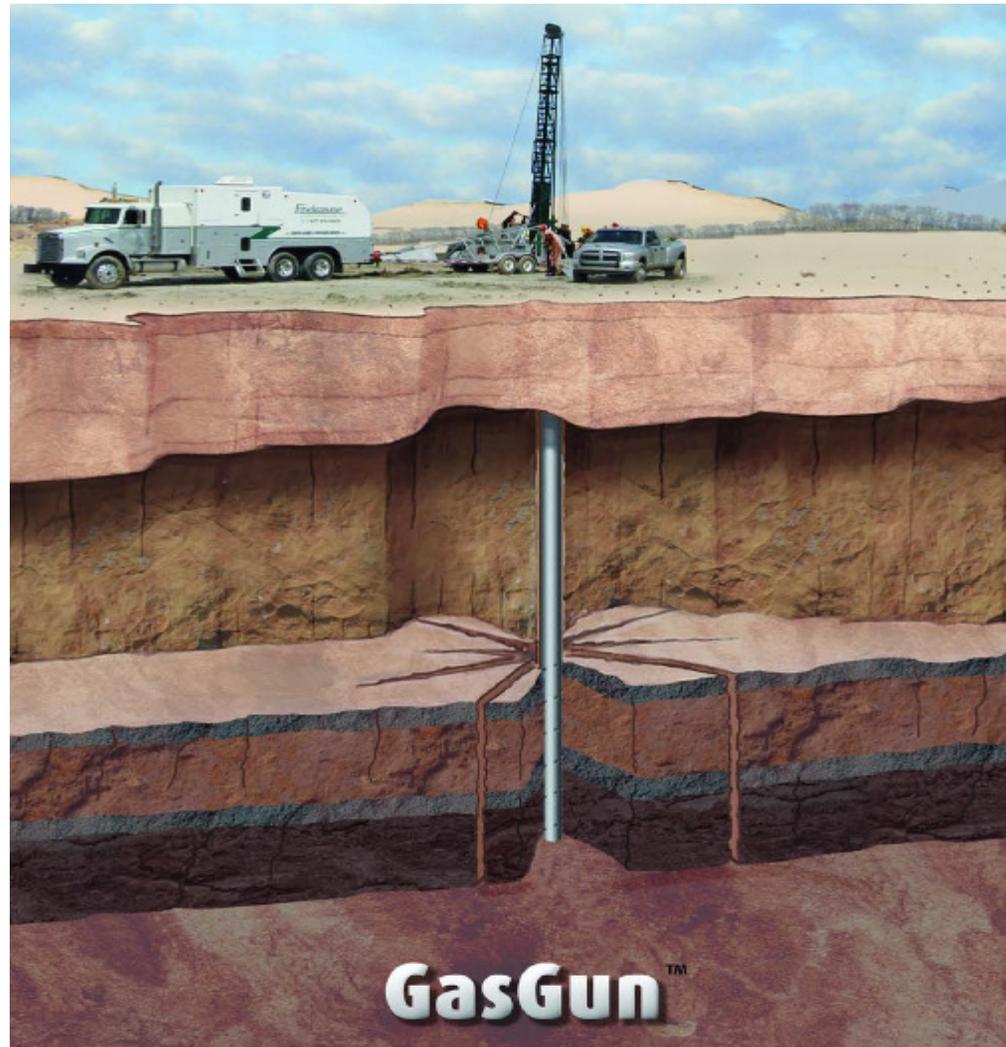
BACKGROUND

- Mature Field in Southern part of Oman
- Different reservoir characters between fault blocks
- Declining reservoir pressure
- Water flood chosen as the IOR solution



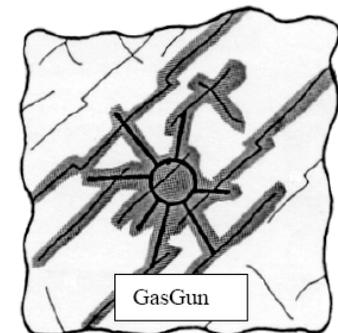
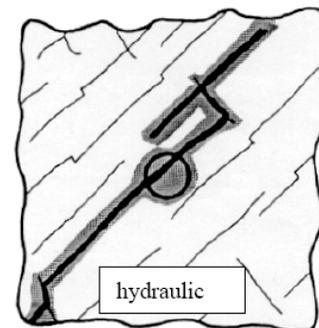
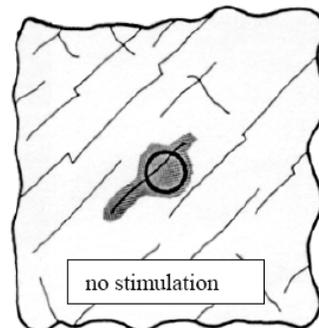
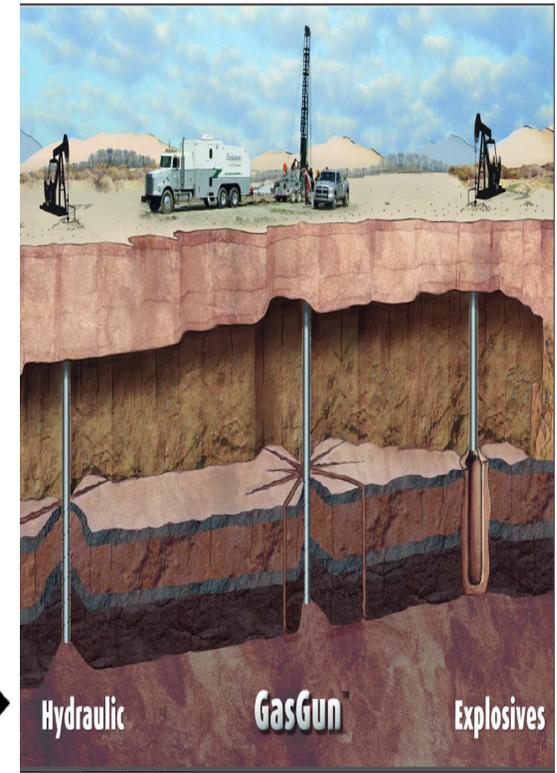
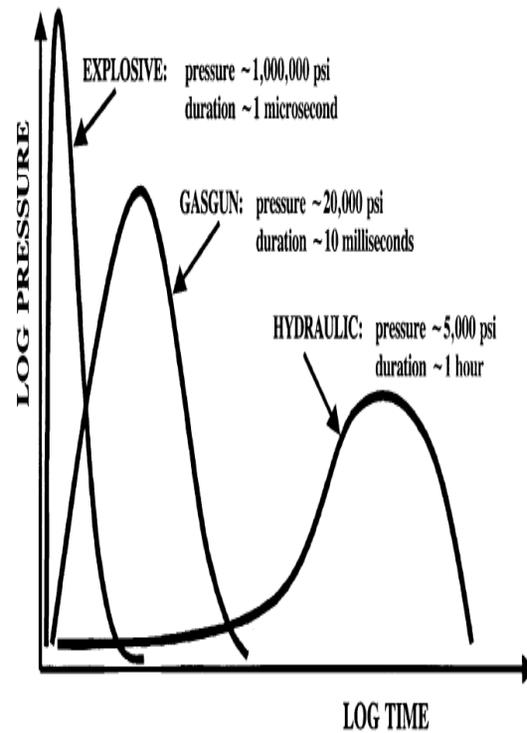
WHAT IS GAS GUN?

- The gas gun is not a simple propellant, it is the new generation (progressive burning propellant)
- A stimulation treatment - utilizes a solid- propellant explosive
- Multiple fractures radiating 10 to 50 feet from the wellbore
- Normally run on Wireline, contains a solid propellant



COMPARISON

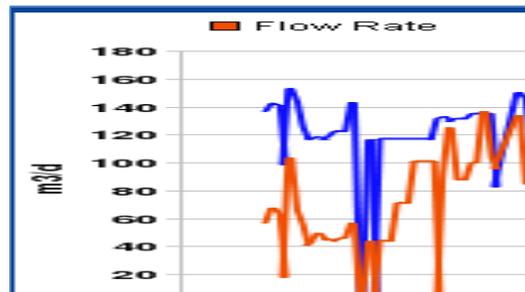
- High explosives, detonate and create a shock wave. Pressures created are extremely high but last only a few microseconds
- The solid propellant used in the Gas Gun does not actually detonate; it deflagrates
- Gas pressures in the range of 20,000 psi are produced that last approximately 10 milliseconds



OUTCOME

- Injectivity test after the conversion works
- Depend of the results, candidates then to be selected
- Had completed five jobs. Four for water flood wells & one producer well – all in sandstone formations.
- An incremental of 100% in term of injectivity rate (compared to the injection rate prior to the application).
- It was 50% incremental gain, with the shorter period compared to injectors.

Well	Observation (before)	After
A	Running hrs - 14	24 hrs (50% Incremental)
B	Inj. Rate : 40 m3/d	100 m3/d (2.5 times better)
C	Inj. Rate : 144 m3/d	216 m3/m (50% Incremental)
D	Inj. Rate : 100 m3/d	Inj. Rate : 200 m3/d (2 times)
E	Exp. Rate : 600 m3/d	Max rate : above 1000 m3/d



DISCUSSION

- The advantages over hydraulic fracturing:
 - ❖ minimal vertical growth of fractures.
 - ❖ multiple fractures are created, the entire zone is stimulated, there is no need to inject fluids.
 - ❖ less equipment is needed, and the cost is much lower.
- Pressures created are between 10-20 thousand psi over 10's of milliseconds
(theoretically, required proven data)

CONCLUSION

- The treatment **can't always replace** hydraulic fracturing.
- Large hydraulic fracture treatments can create **a fracture hundreds**, if not thousands of feet in length.
- But many small pay zones in marginal wells **cannot justify the expense** of these treatments.
- This approach can be a very economical alternative and requires much **less equipment for the job executions**.
- There are many applications where the Gas Gun can be used in place of hydraulic fracturing or in combination with hydraulic fracturing to achieve the desired outcome.

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