

# A W S T E C H N O L O G Y

## ACOUSTIC WELL STIMULATION TECHNOLOGY (AWS)

*Acoustic Well Stimulation (AWS) Technology is a patented technology directed to enhance oil well recovery by the application of specific high power ultrasonic fields on the wellbore.*

**SUMMARY:** Since May 2008, AWS INDUSTRIAL TESTING is being carried out on low-production oil wells in the GREEN RIVER FORMATION, USA. This reservoir was chosen for testing because it is clearly representative of accumulation of NON CONVENTIONAL DEPOSITS.

The crude that lies underneath these fields is directly related with large amount of resources around the world, which today are hard or impossible to be obtained.

Operational conditions in these wells correspond mainly to low permeability, low porosity, low reservoir pressure and low temperature.

Crude oil properties are predominantly high viscosity, low API gravity and high paraffin content.



Fig 1. AWS downhole installation.

The objective of the tests has been to verify a change in oil production on wells where AWS tool has been applied in a permanent stimulation process.

AWS tool was shown to have an immediate and demonstrable effect on oil production.

Production on certain wells has been increased over 1000% compared to former historic production.

*"... If the (AWS) technology becomes widely adapted in the United States and throughout the oil and gas industry, there may be a large increase in production of hydrocarbon fluids. The resulting increase in domestic production could decrease the dependency of the United States on foreign oil".*



U.S. Department Of Energy RMOTC: Office of Fossil Energy 2006 AWS Final Report

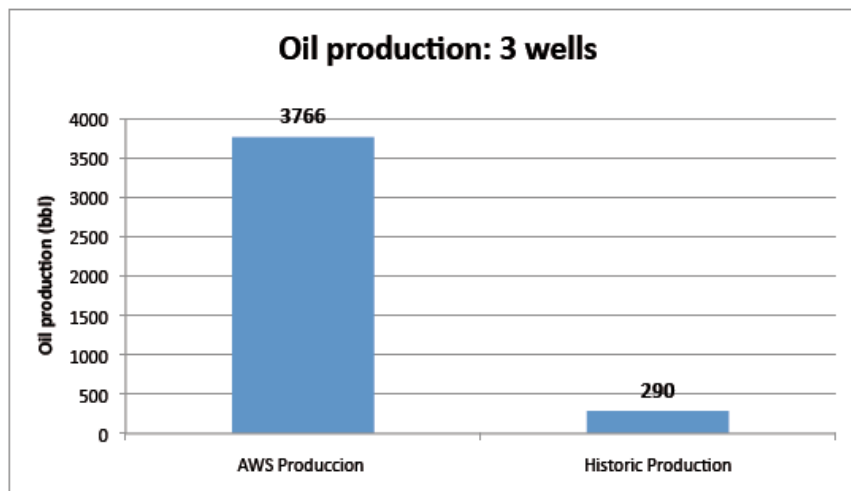
N o v e m b e r 2 0 0 8

# A W S T E C H N O L O G Y

Example of oil productivity enhancement with AWS

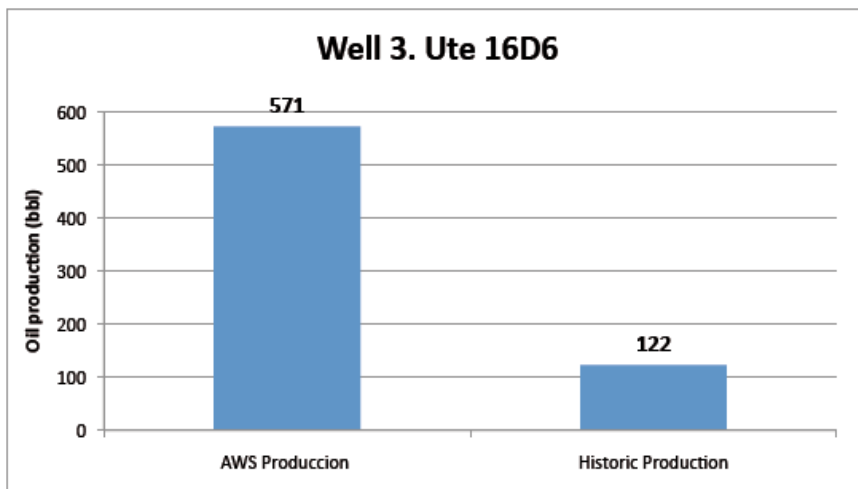
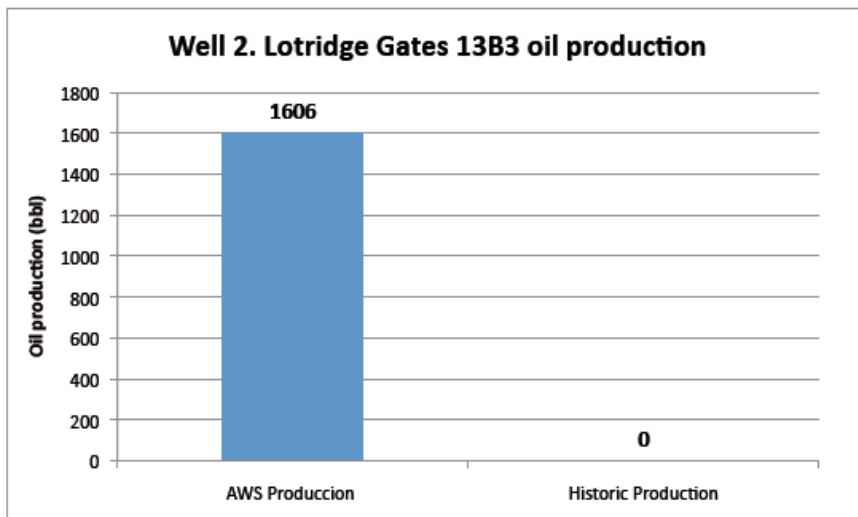
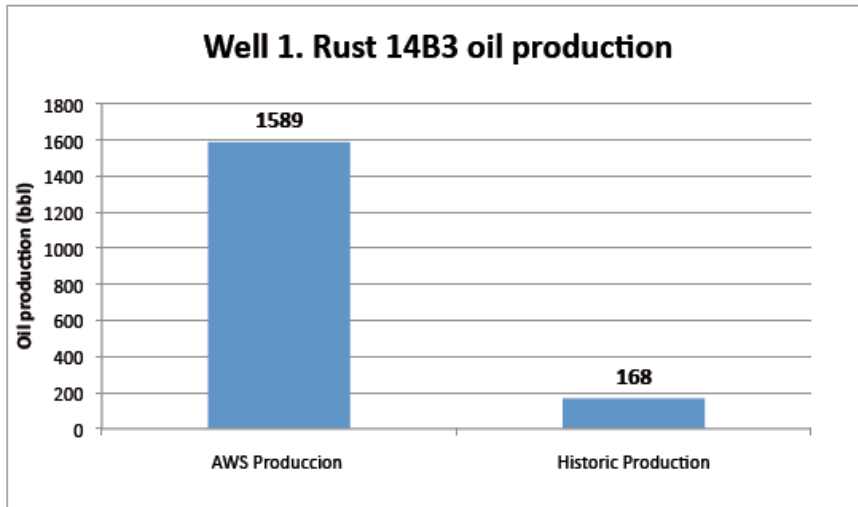
## Production increase for 3 wells (Rust 14B3 - Lotridge Gates 13B3 - Ute 16D6)

Month, 2008	Oil production	historic production	Oil increase
May	335	14.4	
June	232	9.6	
July	523	33.6	
August	984	65.2	
Sept	762	65.6	
Oct	930	101.6	
<b>Total</b>	<b>3766</b>	<b>290</b>	<b>1,199%</b>



N o v e m b e r 2 0 0 8

# A W S T E C H N O L O G Y



N o v e m b e r 2 0 0 8

# A W S   T E C H N O L O G Y

Projection: 1 year of AWS operation on 3 wells = **13,286** bbl oil of increment

The oil produced under AWS effect in **130 days**, would have been produced in **4,7 years** in former conditions (without AWS).

**AWS can be applied on:**

- ▶ **Non conventional oil deposits**
- ▶ **Heavy oils**
- ▶ **Paraffinic oils**

**CONCLUSIONS:**

The technology has been tested in commercially operated oil wells verifying an unprecedented high impact on its productive response.

The effects achieved correspond to:

- ▶ **Restoring effective permeability of the formation** (by removing the formation damage or skin effect).
- ▶ **Increasing crude mobility by significantly reducing its viscosity.**

Through a combination of these effects, the technology developed by Klamath Falls is capable of putting into production reservoirs currently not producing due to its geophysical complexity (very low pressure, low permeability, low porosity and heavy oil).

**THE AWS TECHNOLOGY HAS SHOWN ITS CAPACITY TO TRANSFORM  
RESOURCES INTO PROVEN RESERVES.**

N o v e m b e r   2 0 0 8