

# 'Slow & Easy' Fracture Injection for Enhanced Resource Production from Shale

*Terralog Technologies Inc.™ (TTI™) offers a unique, cost effective and environmental-ly sustainable hydraulic fracturing process for shale resource exploitation.*

Terralog Technologies Inc. has developed and pioneered the use of an innovative low-rate, continuous-cyclic hydraulic fracturing process; the **Slurry Fracture Injection (SFI)™** process. Terralog has been the industry leader in the design, operation and management of SFI deep well disposal for large volumes of a variety of waste streams in the petroleum industry, thereby helping our customers achieve environmentally sustainable (Zero Discharge) exploration and production operations. Recently Terralog has further developed and adapted the SFI process for the fracture stimulation of shale resources, called the **'Slow & Easy' Hydraulic Fracture** process.

## TTI's Slow & Easy Hydraulic Fracturing (HF) Process

An alternative stimulation method developed by Terralog is the **'Slow and Easy'** HF process; an innovative hydraulic fracturing technique for development of short, complex fractures in low permeability, naturally fractured reservoirs such as shale. The Slow & Easy technique is a long-term, cyclic injection process at lower rates and net pressures to enhance the conductivity of the natural fracture system. The premise is that these low-permeability naturally fractured reservoirs (NFRs) can be successfully stimulated at a lower cost and with significantly reduced environmental impact.

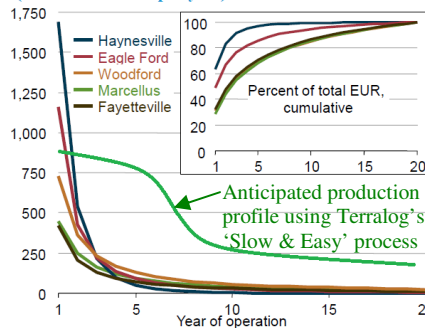
## Slow & Easy Objectives:

- ✓ Use longer-term, cyclic, lower injection rates for a more effective conductivity enhancement of the natural fracture network through geomechanic mechanisms.
- ✓ Enhancement of the natural fracture network system in shales and NFRs, which is a key element to improved and sustained production.
- ✓ Achieve more stable & sustainable production rates over the life of the well.
- ✓ Increase Stimulated Reservoir Volume (SRV), leading to increased Estimated Ultimate Recovery (EUR).
- ✓ An alternative HF process that mitigates many of the concerns being raised regarding environmental security of large scale multi-stage hydraulic fracturing (MSHF) for shale resource development.

## Slow & Easy Advantages:

- ✓ **Reduced stimulation and completion costs**
- ✓ **Less equipment to be mobilized to location:**
  - Smaller footprint, less traffic, less noise
- ✓ **Reduced usage of chemicals**
- ✓ **Reduced environmental risks:**
  - Less aggressive stimulation approach (lower rates and pressures) leads to more controlled SRV.
  - Better containment and SRV distribution in pay zones.
  - Reduced "frac hits" and production interference at offset wells.
  - **Reduced risk of induced seismicity.**
- ✓ **Improved wellbore integrity.**
- ✓ **Compatibility with 'refrac' strategies.**
- ✓ **Fresh water usage can be reduced or eliminated.**
- ✓ **Improved water management during stimulation and production operations.**

Figure 54. Average production profiles for shale gas wells in major U.S. shale plays by years of operation (million cubic feet per year)



From US Energy Information Administration

## How Is The Terralog 'Slow & Easy' Process Different?

- Slow & Easy HF process utilizes low injection rates, cyclic injection for progressive development of short, complex fracture networks.
- Geomechanic mechanisms improve overall natural fracture conductivity in tight formations.
- SRV occurs progressively from the well into the reservoir.
- Increased well spacing due to increased SRV.
- Slow & Easy HF process is an innovative HF process for shale resource development. **Benefits include:**
  - ✓ **Reduced environmental impact from stimulation & production operations.**
  - ✓ **Improved water management.**
  - ✓ **Reduced induced seismicity.**
  - ✓ **Reduced risk of 'frac hits'.**

## Slow & Easy Applications:

- Unconventional shale resource development.
- Stimulation of low permeability, naturally fractured reservoir.
- Ideal for re-fracturing of wells.
- **Optimized water management:**
  - ✓ Re-use of flowback wastewater/produced water.
  - ✓ Allows for integrated water disposal-refrac operations.

For more information  
please contact:



Terralog Technologies Inc

ticalgary@terralog.com

+1-403-216-4730

www.terralog.com

SFI®, Slurry Fracture Injection®, TTI®, and Terralog® are Trademarks, property of Terralog Technologies Inc.