Recycling fracture waters, produced waters saving energy and recovering oil & water

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ecopharos

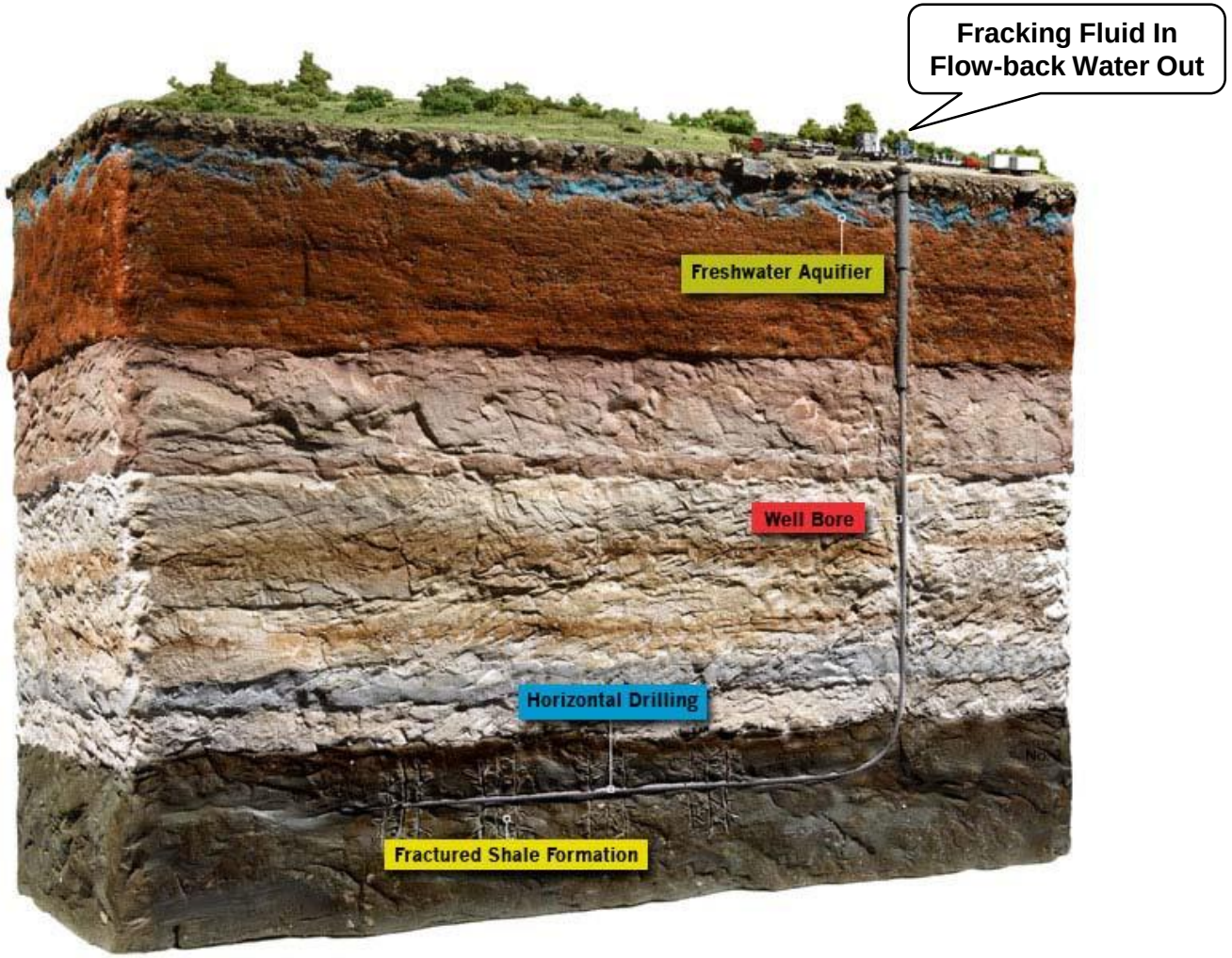
TECHNOFLUIDS

ENERGY SAVING, OILY WASTEWATER TREATMENT,
METALWORKING FLUIDS RECOVERY, POLLUTED OIL RECLAMATION

Shale Gas and Water

- Water continues to be a hot topic in the shale gas industry because recovery of shale gas require large quantities of water. The impact of shale gas extraction on the water supply has already become a controversial issue.

- Enormous volumes of water must be injected to depths often exceeding one mile to free up and produce valued hydrocarbons. But ironically water already existing at those depths may eventually prove to be a matter of greater concern.



Schematic depiction of hydraulic fracturing for shale gas.

Photo Credit: Megan Caponetto/Tom Schierlitz

Hydrofracking

- Given necessary depths to reach oil and gas in these shale plays, the hydrofracking of a typical well can require from 19 to 30 million litres of fresh water.

- These waters are formulated into fracking fluids with the addition of various chemicals and solids known as proppants, which are designed to be pumped under pressure into fissures created in the shale layer in order to open and expand these fissures allowing the release of oil and gas.

Flow-back Water

- Once the hydrocarbons are encountered and the well is ready for production, the bulk of this fracking water returns to the surface under pressure as flow-back water and must be captured and contained due to their hazardous nature.

- Given the often challenging logistics of bringing high volumes of water to remote frack well sites, the oil& gas industry has vigorously pursued technologies that enable the treatment and re-use of recovered flow-back waters.

Injection Well

- Once flow-back waters from the fracking process can not be longer treated or recycled, they must be disposed in Class II deep injection wells. Unfavourable geology makes it difficult to site these wells. As a result, fracking waste and brine may come also from other areas to said Class II wells. As a consequence, it is necessary a close monitoring of said injection wells because of issue of seismic activity.

- These injection wells are not receiving only flow-back water from areas where injection well are not being installed, but also “produced water”.

Produced Water

- Produced water is a complex mixture of organic and inorganic compounds and the largest volume of by-products generated during oil& gas recovery operations.

- The potential of oilfield produced water to be a source of fresh water for water-stressed-oil producing countries and the increasing environmental concerns in addition to the stringent legislations on backflow fluids and produced water discharge into the environment have made oil & gas wastewater management a significant part of *Technofluids'* business.

Treatment Process for flow-back fluids (ex Shale-Gas)

▪ This treatment process, developed by *Dr. Alberto Torini*, will allow to properly clean-up and recycle more than 95% of the water contained in those flow-back fluids.

▪ Treating and recycling flow-back fluids from hydraulically fractured Gas-Shale reservoir require the synergic combination of several complementary technologies suitable to:

- remove heavy metals
- remove soluble and insoluble organics
- reduce salinity
- allow significant volumes of flow-back fluids to be returned as fresh and clean water, thereby significantly reducing water consumption and truck traffic.

Treatment Process for flow-back fluids (ex Shale-Gas)

- The process is finalized for primary treatment of shale gas flow back at or near the source. The system treats flow-back and produced water removing suspended solids and soluble organics from shale gas wastewater and then returns clean brine that can be blended for re-use as hydraulic fracturing fluid.

- The proprietary process developed by *Dr. Alberto Torini* provides efficient removal of sodium and calcium chlorides, as well as heavy metals commonly found in effluents generated from produced waters.

Treatment Process for flow-back fluids (ex Shale-Gas)

- The process is a very low energy solution to modulate the removal of salinity and ions according to the customer's specifications.

- The process includes an innovative solution of fresh water production from sea water which requires only about 3 times less energy consumption than equivalent R.O. process.

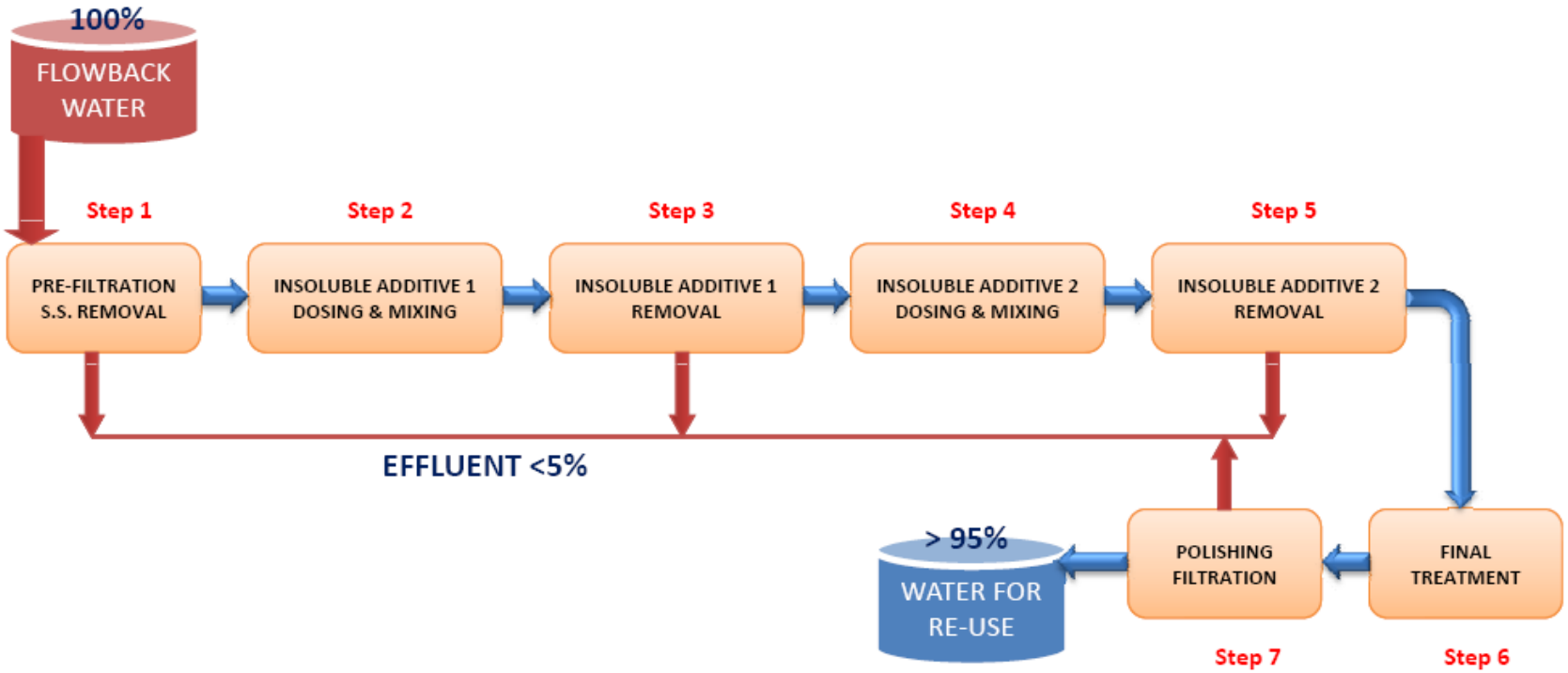
- The process is free from the contamination problem of the key system inside with the help of very effective easy & simple cleaning and discharging ions during the regeneration step.

Treatment Process for flow-back fluids (ex Shale-Gas)

- The process includes total 14 patents invented and developed by *Dr. Alberto Torini*.

- More information will be disclosed after a suitable conditional contract.

SHALE GAS
FLOW BACK WATER TREATMENT



Water Analysis

Flow-back water sample, a shale gas zone in Europe

1. General Characteristics

	IN	OUT
Colour	yellow	colourless
Odour	odourless	odourless
Fluorescence	-	-
Rel. density at 60 ^{o}F	1.0759	1.0181
pH at 73.4 ^{o}F	6.21	6.45
Resistivity at 68 ^{o}F [Ohm*m]	-	-
Salinity as NaCl [mg/L]	123300	28200
Residue at 230 ^{o}F [mg/L]	-	-
Residue at 356 ^{o}F [mg/L]	-	-
Residue at 1112 ^{o}F [mg/L]	-	-

2. Ionic Analysis

[mg/L]	IN	OUT
Na	23100	9700
K	910	200
Li	16	0.1
Ca	18000	663
Mg	2200	272
Ba	16	1.1
Mn	10	6.8
Al	<0.5	<0.05
Sr	890	101
Fe	41	0.8
NH_4	-	-
SiO_2	29	25
Cl	74600	17100
SO_4	101	95

[mg/L]	IN	OUT
NO_3	<5	<5
F	-	-
Br	-	-
I	-	-
PO_4	-	-
Formate	-	-
Acetate	-	-
Propionate	-	-
Butyrate	-	-
Alkalinity	230	-
H_3BO_3	286	<1
OH	<1	<1
CO_3	<5	<5
HCO_3	-	-

Technofluids

- *Technofluids* has set itself the goal of becoming a leading vendor of complete solutions for oily wastewaters treatments and for custom complete solutions which are designed to further conserve valuable resources by saving energy recovering oil and water.

- With escalation of oil and gas production in Gulf Arab States, if desalination plants were damaged, the UAE would only be left with four days of water. But *Technofluids'* thermo-volumetric motor generator combined with concentrated solar power (production of fresh water from sea water) is emerging as the most promising solution to water poverty in the region.

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