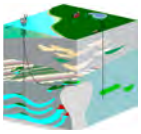
KMS Technologies
Innovating Solutions

Reservoir monitoring with array electromagnetics

Products used:
KMS 820 array receiver
KMS-5100 transmitter
Sensor options:
- Induction coils
- Fluxgate magnetometers
- Electrodes
- Geophones
- Accelerometers
- Shallow borehole EM (3C)
- Shallow 3C geophones



Monitoring benefits

KMS Technologies provides equipment and services (from consulting to monitoring support) for Full Field reservoir monitoring for onshore and offshore application including borehole sensors (permanent and semi-permanent).

Our target market is the **oil and geothermal reservoirs** from 100 m to 6 km below the surface.

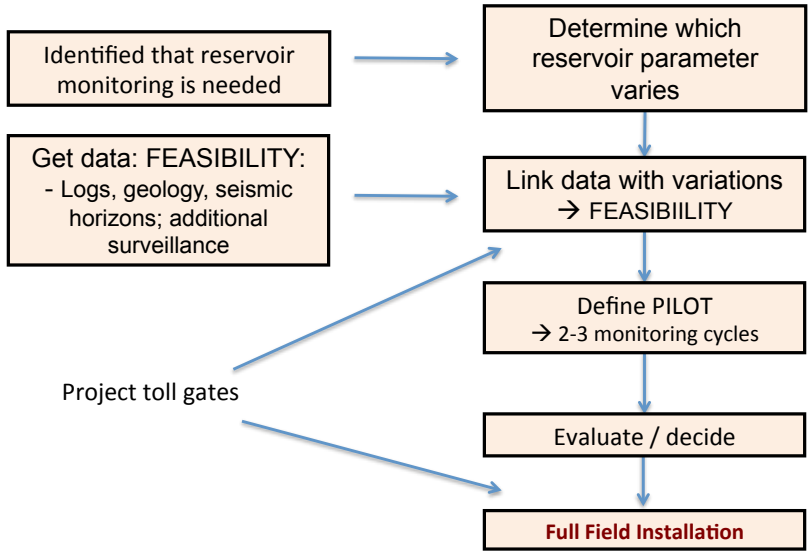
Benefits:

- Monitor flood front (steam, water, and CO_2)
- Image hot/cold section of reservoir
- Predict water break through
- Monitor caprock integrity (oil & shale gas)
- Monitor attic oil/water

Proposed workflow

The monitoring technology is based on KMS Technologies patent portfolio, hardware (land, marine, and borehole) and experience of more than 20 years. We usually identify with the client the reservoir issues and if monitoring can solve it. If so, we carry out feasibility and proposed a work program specific for the reservoir including all specific field conditions. This may include surface, borehole and or marine measurements or a combination thereof. Due to our extensive sensor portfolio, we can monitor any type (conductive/steam or resistive/oil target).

Reservoir monitoring: Problem to implementation workflow



KMS Technologies

KJT Enterprises Inc.
6420 Richmond Ave., Suite 610
Houston, TX 77057
USA

Tel: +1.713.532.8144

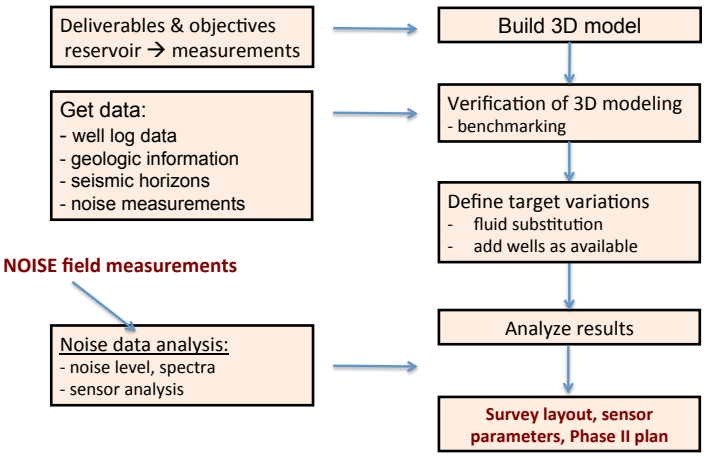
Email: info@KMSTechnologies.com
www.KMSTechnologies.com

Feasibility workflow

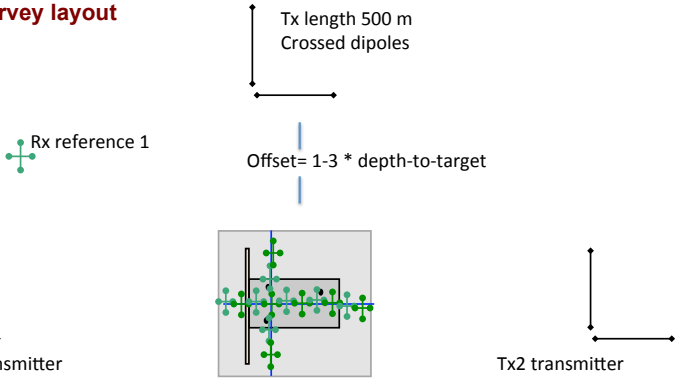
Feasibility uses client data, noise measurements and 3D modeling to determine the exact monitoring parameters and verify that the parameter changes can be measured and resolve in the data.

Input: Output:
Client's data noise measurements → Sensor sensitivities & survey plan

Feasibility workflow for reservoir monitoring



Survey layout



References/ Patents

Strack, K.-M., 2004, Surface and borehole integrated electromagnetic apparatus to determine reservoir fluid properties, US 06739165 .

Strack, K.M., L.A. Thomsen, and H. Rueter, 2007, Method for acquiring transient electromagnetic survey data, US 07203599.

Strack, K.M., and Aziz, A.A., 2012, Full Field Array ElectroMagnetics for hydrocarbon reservoir exploration and monitoring, Geohorizons, Special Issue on Shale Gas, 18, 32-43.

We carried out feasibilities in North and South America, Middle East, Asia, and Europe. We are preparing another pilot in an Asian country.