

Tracing of Oil, Gas and Water



The tracer concept for measurements under production conditions

The use of tracers permits efficient and reliable measurements of oil, gas and water flow in process units and subsea reservoirs. Typical problems to be assessed by tracer studies include:

- Residence time distributions
- Flow rate measurements
- Breakthrough times
- Inter well connections.

Platform process equipment

Measurements of residence time distributions in oil, gas and water in separators and liquid carry over tests are made with tracers for identification of undesirable flow patterns and improvement of separator performance.

Flow measurements using tracers are performed in all piping systems carrying oil, gas or water including separators, compressors, injector systems, and flares. Tracer flow measurements are well suited for special purposes at locations where flow is normally not metered.

Calibration of flow meters, otherwise difficult of access, is regularly performed by accurate, versatile, and efficient tracer methods based on international standards.

Leakage between flow streams in heat exchangers is yet another example of tracer capability for trouble shooting during normal production conditions.

Subsea reservoirs

Tracing of water or gas in reinjection studies yields essential information to be utilized in reservoir modelling and in planning of enhanced oil and gas recovery. Information from tracer studies includes:

- Identification of inter well connection between injectors and producers
- Determination of breakthrough times
- Identification of channelling and fractures.

Proper selection of tracers for measurement of waterflood and gas reinjection with respect to obtaining maximum information and operational safety is made as a first step towards a successful tracer study. A number of candidate tracers are available for water and gas depending on reservoir and experimental conditions such as time scale, expected dilution volumes, etc.

Injection of water and gas tracers is performed by specially engineered equipment meeting the highest requirements for fast and safe operation.

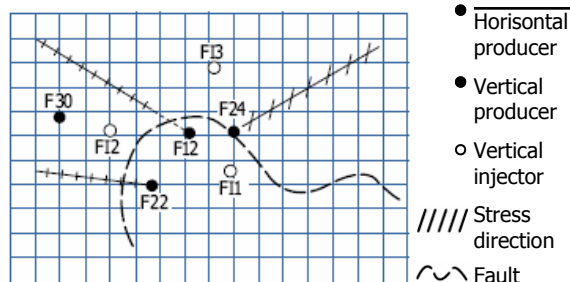
On site monitoring of tracer content in produced water or gas is performed by rugged detectors mounted outside the pipes in connection with high rate injection or short-term studies. Laboratory analysis is performed with high accuracy and low detection level on water and gas samples of a wide selection of tracers used in low rate injection or long-term studies. Breakthrough time of several years is easily determined.

Safety

The use of highly sensitive detectors for on site measurements and advanced instruments for sample analysis permits the use of minimum amounts of tracers - for the benefit of safety and costs.

Handling of radioactive tracers is performed by skilled operators and no special safety precautions are needed for platform personnel.

Transport and handling of tracers follow international regulations under licence from National Radiation Health Authorities to FORCE Technology.



Further information:

Niels Hald Pedersen, tel. (direct) +45 43 26 75 14, nhp@force.dk
Torben Sevel, tel. (direct) +45 43 26 74 85, ts@force.dk

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