

IRT Newsletter

Winter 2018



Our mission is to provide the highest quality engineering and geoscience consulting services to the petroleum industry in a creative, technologically rigorous, ethical, and cost effective fashion.

Industry turnaround ahead in 2018!

Oil prices have stabilized and are starting to nudge above \$60 a barrel in 2018. Now is the time to let IRT assist you with any subsurface needs you may have. IRT offers technical reservoir management consulting services to the worldwide petroleum industry in both conventional reservoirs and unconventional resource plays.

IRT employs only highly experienced petroleum engineers, geophysicists, geologists, petrophysicists and contract professionals, who can perform integrated reservoir and well management studies.

Our staff is unique in today's petroleum consulting industry with our professionals averaging 33+ years of experience in their specialty. Our staff has worked on some of the world's largest oil fields and most promising exploration and development areas.

We invite prospective clients to explore our service offerings and our unique capabilities to help you achieve resource development success.

Ethane EOR Update

Horizontal drilling and new fracture stimulation in the last 10 years has opened up many new shale plays and basins in the US. However, many companies have come and gone during the price crash of 2014. With prices back on the rise, many operators are now considering long term enhanced oil recovery projects in these plays.

IRT has recently helped several companies evaluate their fields for Ethane or other miscible gas EOR for several key shale plays and tight oil reservoirs. Key topics of interest include "bubble point death" and the well spacing versus impact of "frac hits" for several operators.

New Ethane EOR Project

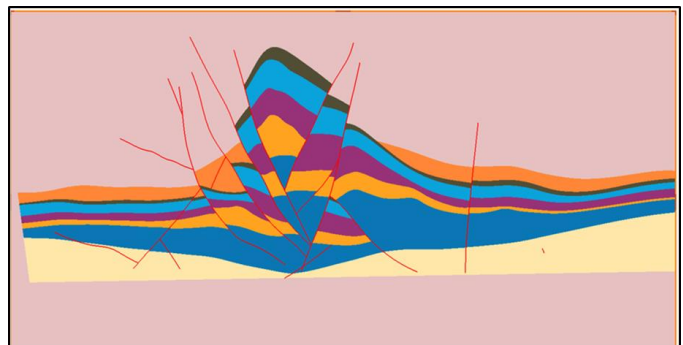
A new ethane EOR project has recently been

commissioned. IRT has performed an integrated reservoir simulation study of a fractured limestone field in the Williston Basin. A variety of EOR options was evaluated with ethane injection showing the greatest benefit of the options available. The positive results of this work have led to the commencement of an injection project which is expected to increase the remaining recoverable oil by 20%.

IRT created a geocellular static model with the structural framework and petrophysical properties of the field. This static model was used to create a simulation model with two main objectives:

1. Build and history match a dynamic reservoir model of a limestone reservoir,
2. Utilize the history matched model to access the potential incremental oil recovery by implementing EOR processes including CO₂ injection and miscible hydrocarbon injection.

Integration of well logs and 3D seismic over the field were used to build a structural framework of this highly faulted field. A structural cross section of the field is shown below.



Because of the faulted nature of this reservoir, a dual porosity model was created to characterize the matrix and fracture porosity in the static model. Fault proximity and second derivative maps in relationship to the in-situ stress orientation were also used to estimate fracture density.

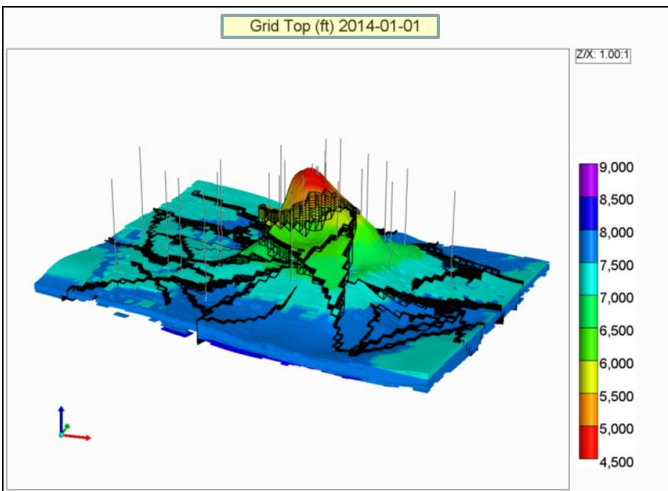
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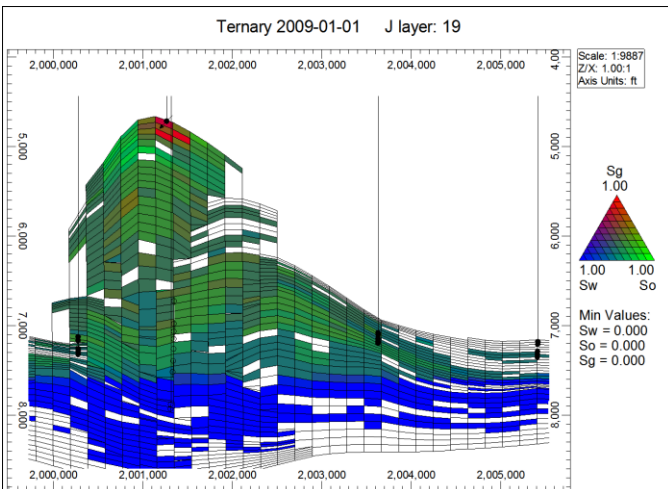


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A 3D reservoir model of the limestone reservoir was created for simulation of the dynamic fluid flow in the faulted structure shown below.



The simulation model was used to predict the performance of various miscible gas injection scenarios. Historically a small amount of gas had been injected at the top of the structure. A cross section at 2009 of the simulation model shown below represents the gas injection (red shaded cells) into the oil column (green shaded cells). The simulation model predicts an incremental increase of 20% of the remaining recoverable oil for the recently commissioned project.



Ethane EOR Screening Offer

IRT is offering free screening of your potential Ethane EOR reservoirs. The screening template consists of 16 reservoir parameters (depth, porosity, oil API, etc.) to help in evaluating your reservoir for Ethane EOR. The screening will estimate the remaining EOR prize and the amount of miscible injectant needed.

If Ethane EOR looks promising, then a phased approach is recommended to further refine the Ethane EOR potential:

1. Mechanistic Model: 1 injector and 1 producer model to refine recovery factor, gross and net injection efficiency, and estimate an initial return on investment (ROI) for the project.
2. Type Pattern Model: 2 or more injectors with offset producers to develop a more detailed geologic description that would help design a future field test or pilot area for Ethane injection.
3. Full Field Model: If the Type Pattern model and potential field test prove successful, the final step is to develop a full field development plan by creating both a static and dynamic reservoir model using the best petrophysical, geologic, and engineering information available. The final reservoir model is calibrated to historic field production data and creates a base case field development plan for Ethane EOR.

All data sent to IRT for the initial screening offer will be held in strict confidentiality and could provide your company with valuable information for any future EOR project.

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