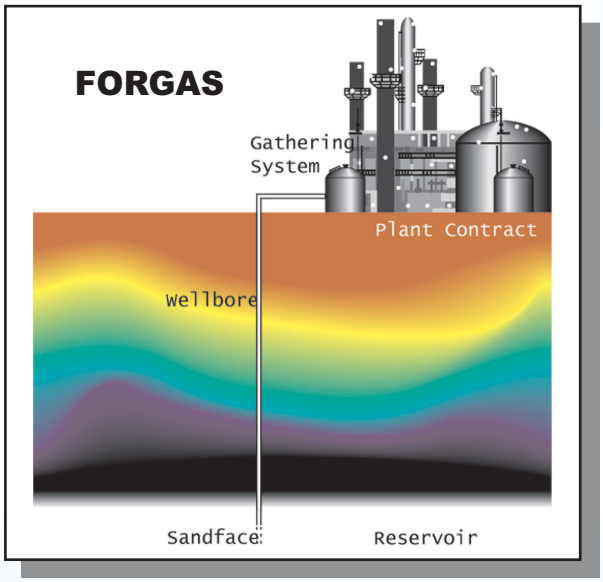
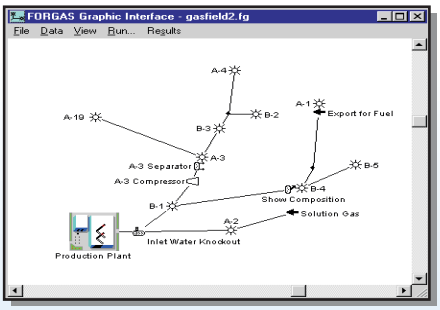


forgas

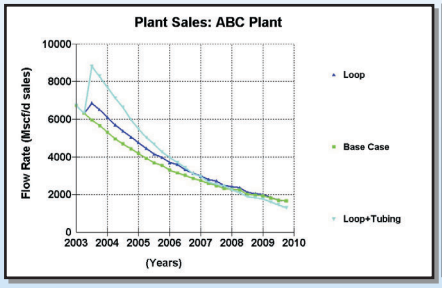
Gas Field Deliverability Forecasting and Development Scheduling

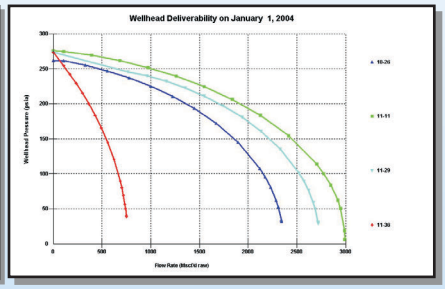
Neotec's **FORGAS** software has been used by the international oil & gas industry for over 20 years for long term and short term forecasting of gas production and gas storage systems. **FORGAS** helps you quickly and easily evaluate the characteristics and consequences of a wide variety of development and operating strategies.

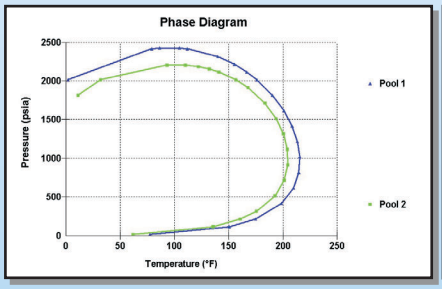


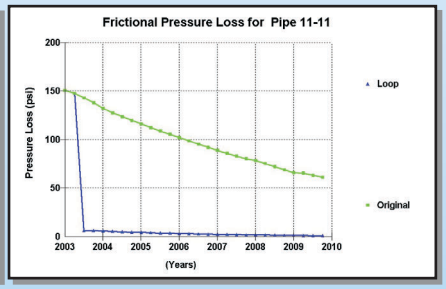
Simulates

- Gas/water/condensate systems
- Depletion of reservoirs (tank type or links to 3D models)
- Inflow into wellbore
- Multiphase flow in tubing
- Multiphase flow in gathering system
- Field facilities (compressors, separators, water knockouts)
- Ability to meet contract requirements over time
- Gas production and gas storage



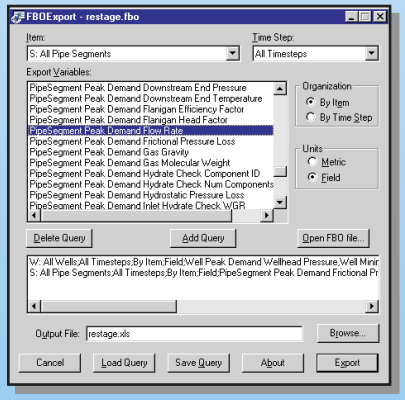






HOW **FORGAS** can Save (and Make) You Money

- Predict how to improve competitive position
- Determine viability of maintaining contract
- Evaluate benefits of drilling wells and/or adding compression
- Determine optimal compressor placement
- Evaluate the benefits of changes to the gathering system and wells
- Evaluate wellbore configuration changes (e.g. siphon strings)



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TRAINING AND USER SUPPORT BY PETROLEUM HYDRAULICS EXPERTS

- Regularly scheduled no-charge software training seminars in the Neotec Training Centre
- On-site training available
- Software support (included at no additional charge)
- Gas forecasting / Multiphase Course

PRINCIPAL FEATURES OF FORGAS

Easy data entry using FGI

Save all of the data for your model in a file that is created interactively using the **FORGAS** Graphic Interface, **FGI**, within Microsoft Windows 98, 2000, Me, XP or NT. Using **FGI**, graphically display the gathering system showing pipelines, wells, and facilities. Merge **FGI** input files either to add a separate plant or to add wells and pipelines into the gathering system of an existing plant.

Various types of reservoirs

Handle multiple reservoirs using any of the following:

(a) volumetric depletion method (tank model)
(b) Hurst and Van Everdingen water influx (tank model)
(c) Hurst and Van Everdingen gas influx (tank model)
(d) material balance based on user supplied historical production data (tank model)
(e) **IMEX** three dimensional reservoir simulator (from The Computer Modelling Group)
(f) **ECLIPSE** three dimensional reservoir simulator (from Schlumberger)

Allow gas to move between connected reservoirs based on a specified transmissibility.

Versatile fluid property input

Select one of the built-in equations of state such as Peng-Robinson or Soave-Redlich-Kwong. Print phase diagrams. Track the water and composition produced by each well throughout the gathering system. Model simplified fluid systems.

Individual well deliverability

Determine individual well deliverability using the Rawlins and Schellhardt equation or the Laminar-Inertial-Turbulent (L.I.T.) equation. Compute the constants for these equations using either wellhead or bottom-hole pressure and flow rate data. Calculate the L.I.T. coefficients using the Jones, Blount and Glaze equations for gravel pack or open perforations. Constrain each well's maximum production using a fixed rate and/or drawdown limitation.

Vertical or deviated wells

Calculate pressure losses using individual wellbore depth and drilling profiles for both vertical and deviated wells, described with up to 5 segments. Flow may occur in the casing, tubing, annulus or both the annulus and the tubing. Predict multiphase pressure losses and minimum rates to lift liquid using several methods including Aziz, Govier and Fogarasi, the OLGAS mechanistic model, Hagedorn-Brown, Beggs-Brill, and Gregory model.

Detailed gathering system specifications

Model complex branched gathering systems using multiphase flow procedures such as the OLGAS mechanistic model, Beggs-Brill, and Eaton-Oliemans. Include the effects of field facilities such as compressors, valves, dehydrators, imports, exports, extractors, water knockouts, max flow limits and separators. Calculate compression requirements using the Katz equation for single or multistage configurations. Model compressor capacity limitations.

Multiple production and injection plants

Assign gas production from a single reservoir to as many as three separate plants to determine the effect of competitive drainage and gas injection for gas storage.

Various types of contracts

Rigorously model United Kingdom and Conventional contracts, specified in terms of gas flow rates or heating value. For United Kingdom and Netherlands contracts, automatically iterate to determine the maximum DCQ that can be maintained over the entire contract period. For single contract plants, print true maximum deliverability, peak demand conditions or both. Specify several contracts within one gathering system when production from a well is not shared between contracts. Model plant capacity restrictions by assigning a production priority to each contract.

Scheduled compression and infill drilling

Determine when plant compression and/or infill wells are required to meet contractual peak demand specifications, based on the calculated capacity of the contract and a user defined development schedule. When able to deliver the peak demand rate, prorate production between wells.

Optional time varying parameters

Change parameters (e.g. compression, contract requirements, well recompletion, etc.) at any day of the forecast to simulate different development strategies. Use the restart option to easily start forecasts from an intermediate date.

Detailed results

Determine, as functions of time, the pressures in the reservoir, at the sandface, at the wellhead, and in the gathering system, the flow rate from each well and the compression required. Print the composition entering and exiting each extractor and the extracted products (sulphur and condensate). View the volume and composition of the gas, condensate and aqueous phases formed at the outlet of separators and dehydrators. Forecast the average production from individual wells and/or groups of wells, each reservoir, each contract, each company (as specified by well working interests), each extractor, each separator, each dehydrator and each plant. Print the compressor forecast of power usage, throughput rate and inlet and outlet pressure. Predict the maximum temperature at which hydrates will form for wells, nodes, pipe segments and field facilities, using the technology of DB Robinson and Associates, and the current pressure, composition, and water/gas ratio. Check where in each wellbore hydrates will form. Transfer predicted production data to the petroleum economics evaluation program, PEEP, from Merak Projects Ltd. Create a standardized spreadsheet file of results for plants, contracts, companies, report groups, compressors and individual wells. Create a customized Excel spreadsheet by selecting the results and/or input data to be included.

Analyze the results of several cases and/or several items (e.g. multiple wells) on one plot. Obtain plots of wellhead pressure versus flow rate at any time step in the forecast. Plot multiple phase diagrams on the same graph.