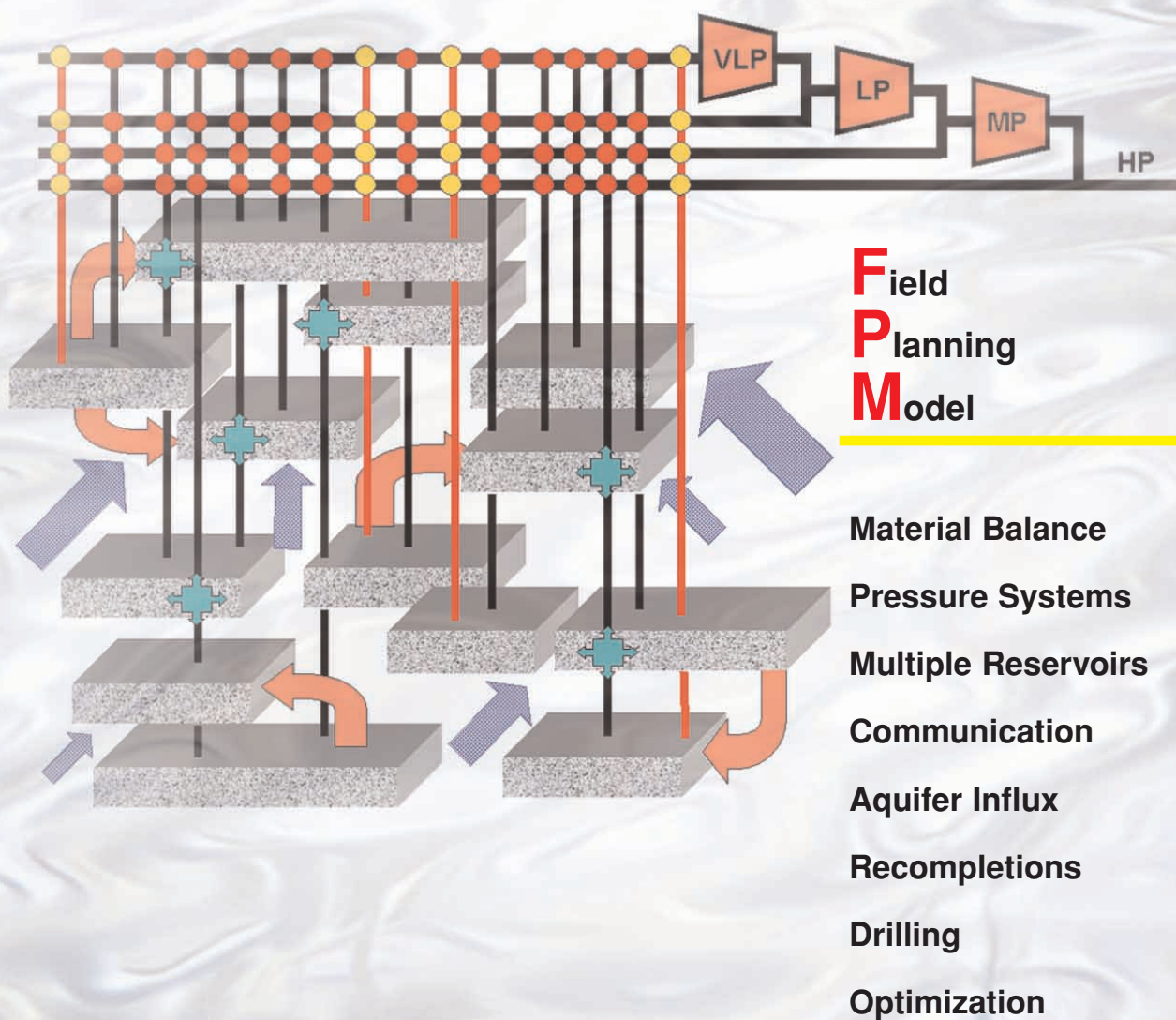
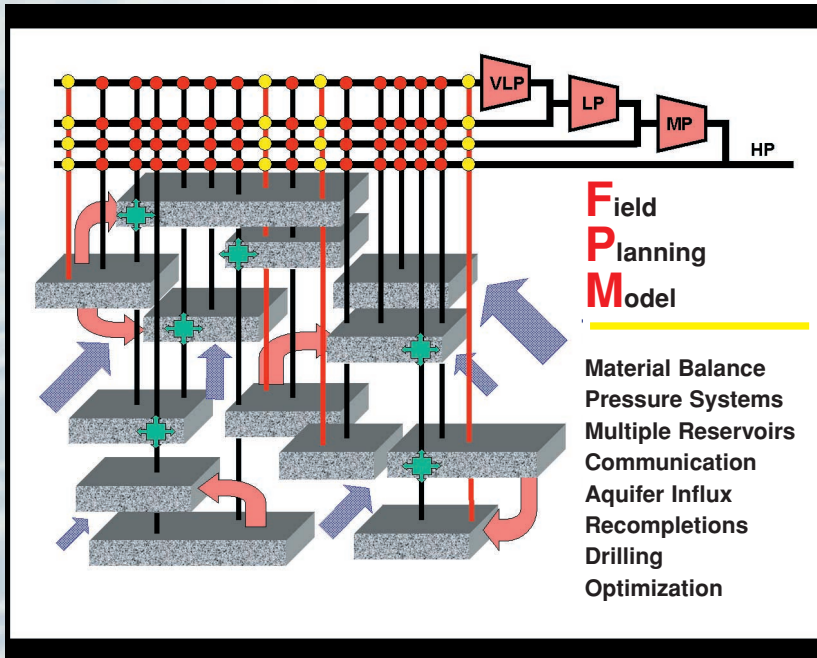




Field Planning Model





FPM is a revolutionary concept in field depletion planning. Driven by material balance and diffusivity you can find well deliverability to multiple pressure systems with optimal compressor loading.

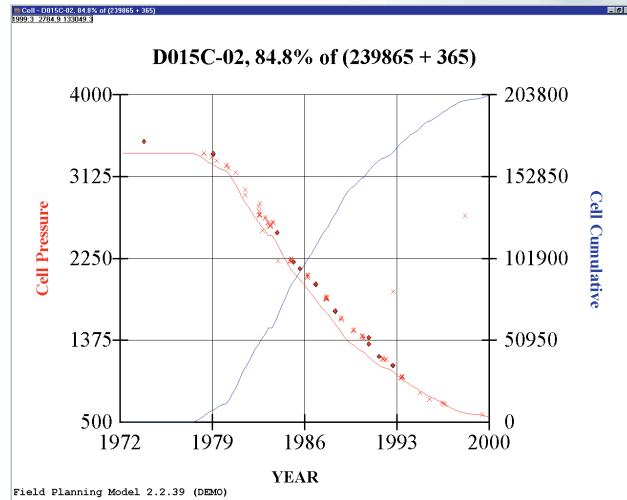
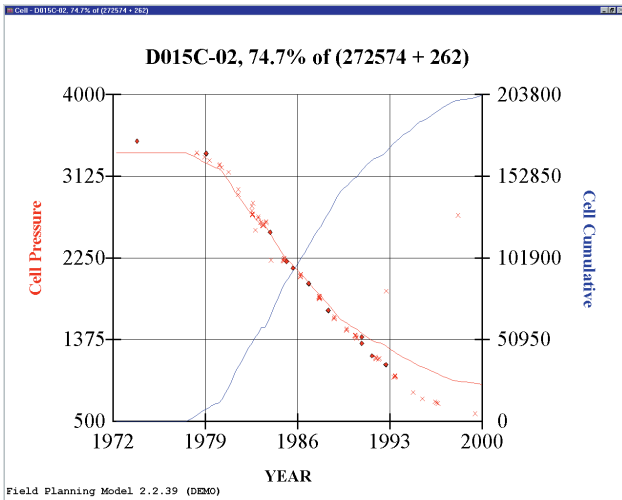
Reservoirs can be modeled as single or multiple cells. Any cell can be connected to any other cell with variable transmissibility. Cells can have aquifers attached using a Fetkovitch steady state model.

Once a well has depleted its' reservoirs, FPM will automatically perform a workover based on user supplied criteria. Wells can be single, single selective, dual, dual selective or monobore completions. FPM will prioritize wells "waiting for workover" to select the best candidate to meet the demand schedule.

If drilling is required to meet demand, FPM will prioritize "new wells" to select the best candidate. There are also several optimization functions available to find the best order in which to drill new wells to meet a demand schedule.

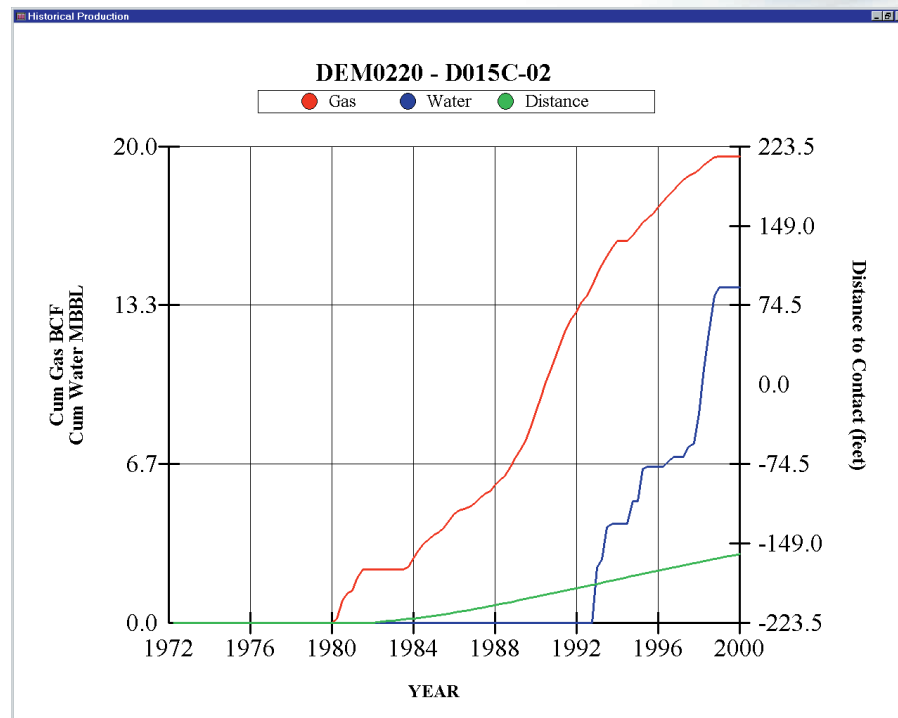
FPM has many built-in functions to help the engineer history match reservoirs and well performance. FPM also has a full featured surface pressure network solver for predictions. The engineer can adjust flowlines and pipelines for de-bottlenecking.

And there is a mapping interface to geologic data!



A simple adjustment of gas in place may be all that is required, or is it?

Historical data indicates wells have been producing water from the reservoir. Adjustable aquifers may be attached to reservoirs and tuned to match performance. FPM also calculates the distance from the Gas Water Contact to the base of the well as shown in the following plot. This data is used to “match” water arrival at each well and “adjust” the calculated contact movement. During the Prediction phase, FPM selects which reservoir is to be produced to minimize water production and plan workovers and drilling appropriately.





Adding an aquifer can improve the match and honor historical data.

Water Influx Data

Cell Name: 133-D015C-02 Aquifer Volume: 12490.7 MM bbls

Aquifer to pore volume ratio: 60

Map Volume to IGIP ratio: 3379.7

Aquifer length to width ratio: 10

Water to gas zone permeability ratio: 0.85

Aquifer thickness: 10

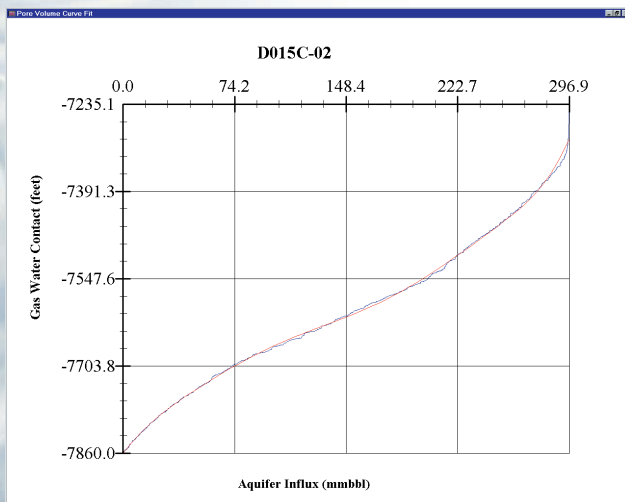
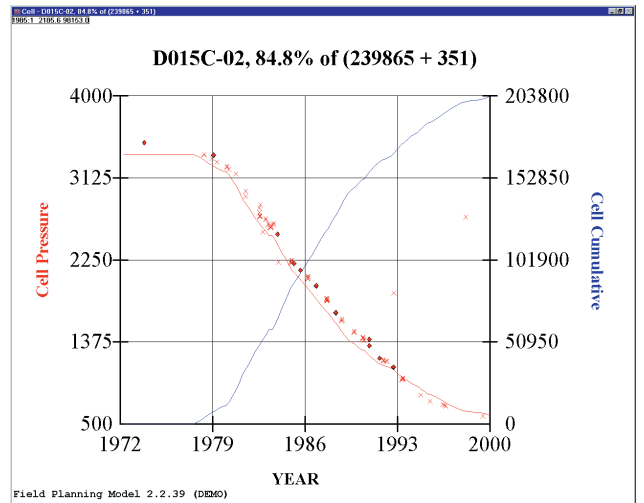
Pore Volume Influx Cutoff

Parameter	Value	History	Prediction
Highest structural elevation (feet)	7235.1		
Gas water contact (Initial) (feet)	7860	7795.6	0
Influx tuning factor (0.5 <= X <= 2.0)	1	Default	
Trapped gas saturation	0	0.3	
Pore volume cutoff	0	0.5331	
Lowest structural elevation (feet)	8210.88		

Aquifer Feed: Bottom Type of Fit: 01 - Variable order Polynom nPolly 1 - 7

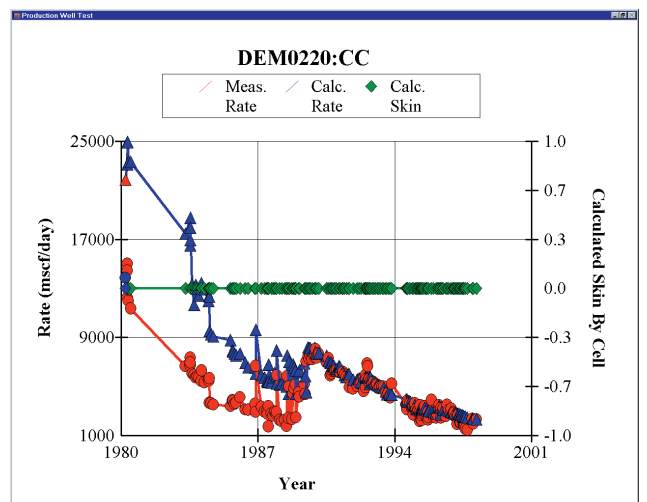
Coefficients: a -6.27031e+002 Deviation: 0

Buttons: OK, Cancel, Map Plot, Prediction, History Match



FPM uses a unique approach to calculate contact movement. Based on geologic data, a relationship of depth versus pore volume is established. This reservoir “shape” or pseudo curve determines break-through and encroachment of water into the well bore.

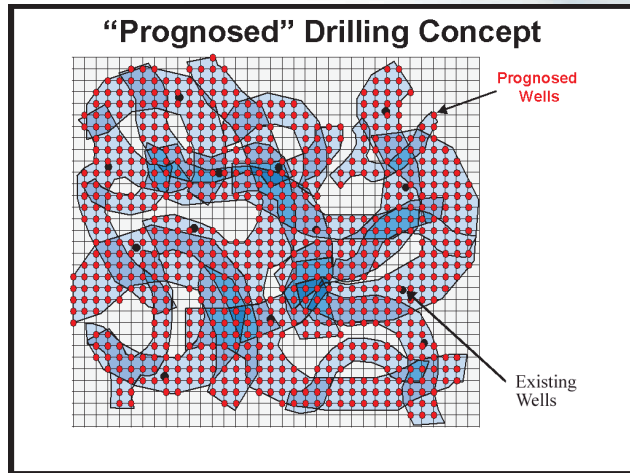
Production test data is used to match well historical performance, including contact movement. This will ensure accurate deliverability calculation during the prediction phases.



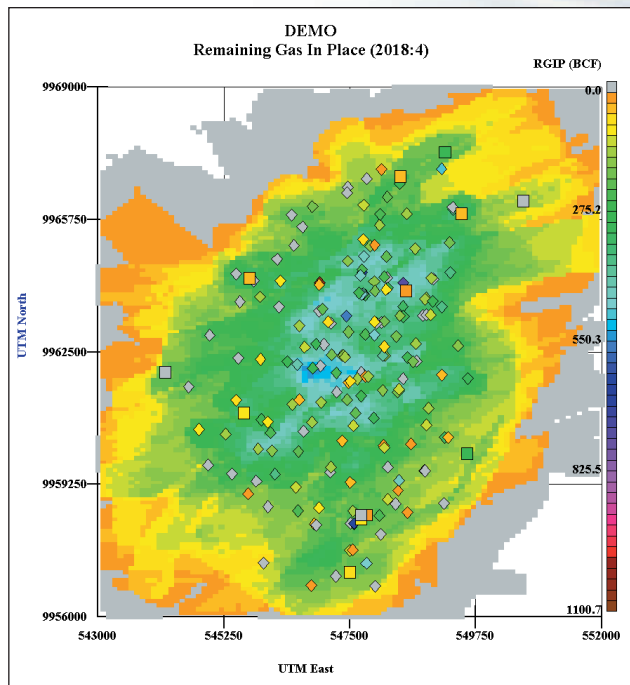
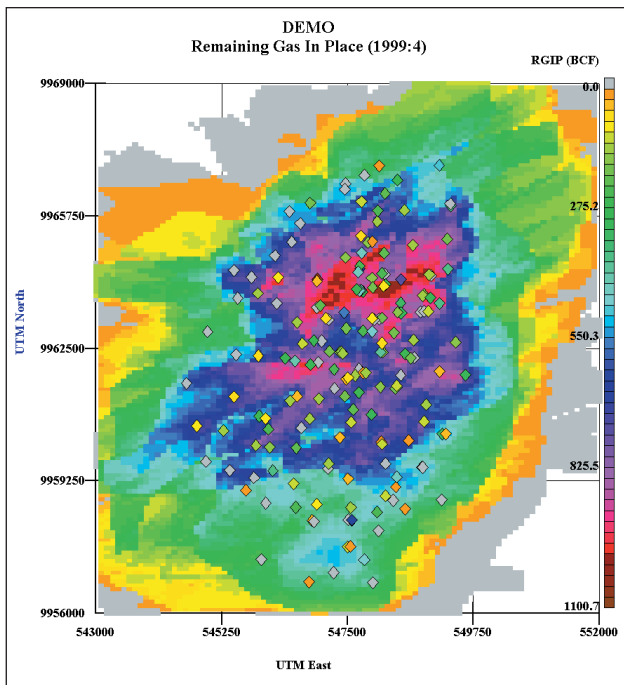
Data is imported from a mapping package such as Z-Map or CPS-3 and read into FPM on a user defined grid, usually 100 meters. A “virtual well” is created at each grid node with all the reservoirs that it intersects. This is known as a “Prognosed Well”.

A prediction base case establishes workovers for existing wells, facility modifications and a current drilling schedule. FPM “drills” each prognosed well individually, and calculates the incremental field recovery. This establishes which well has the least interference and the best possible facility path. The next phase is to drill the best well with each of the remaining prognosed wells to find the second best well.

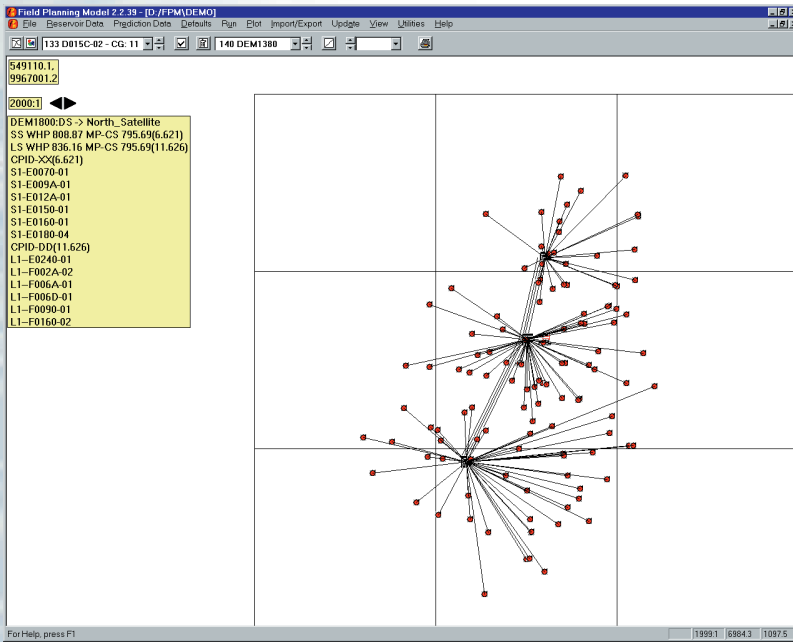
Depending on the size of your field, this process can take hours or weeks. FPM has a built in



“Drilling Manager” that will find “friendly” computers on your network and give them wells to drill. Using this technology FPM can make a two week job into an overnight run!



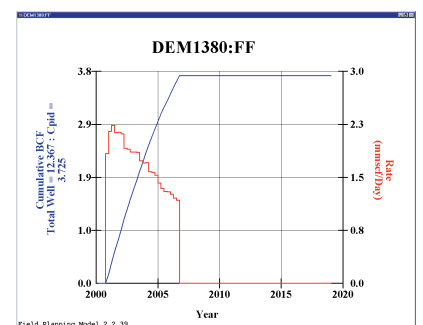
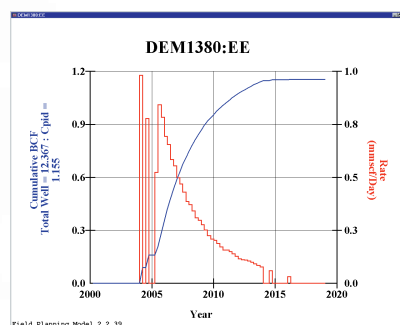
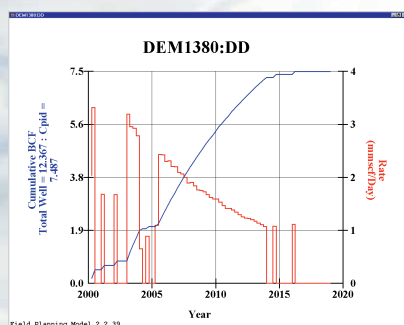
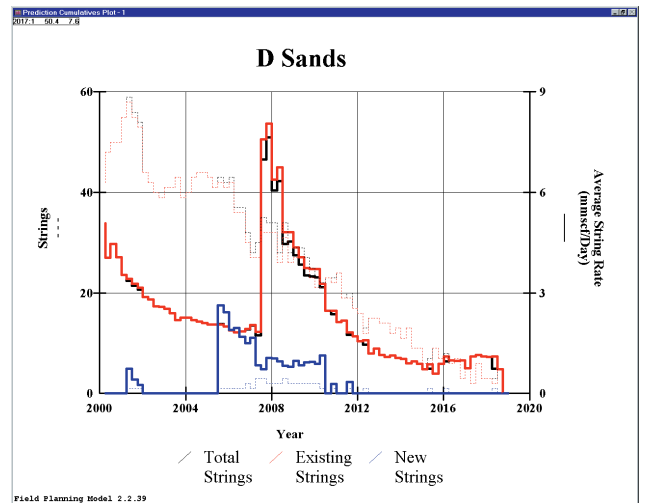
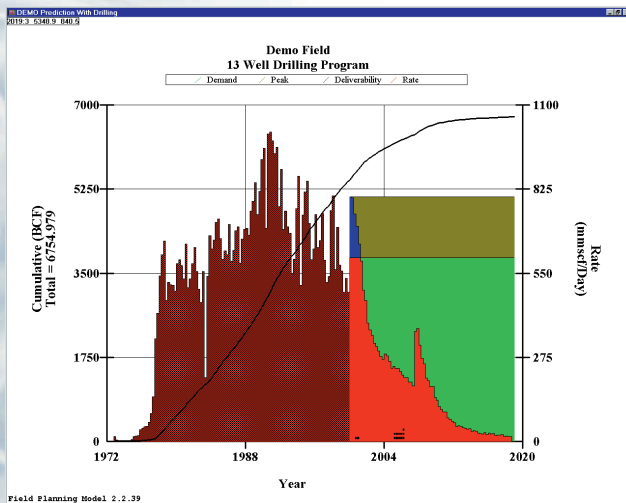
Do you know where your gas is? Using the Prognosed Wells, FPM can generate plots to show the remaining gas in place before and after a prediction run. The diamonds are existing wells and the squares are drilled wells colored to show recovery.



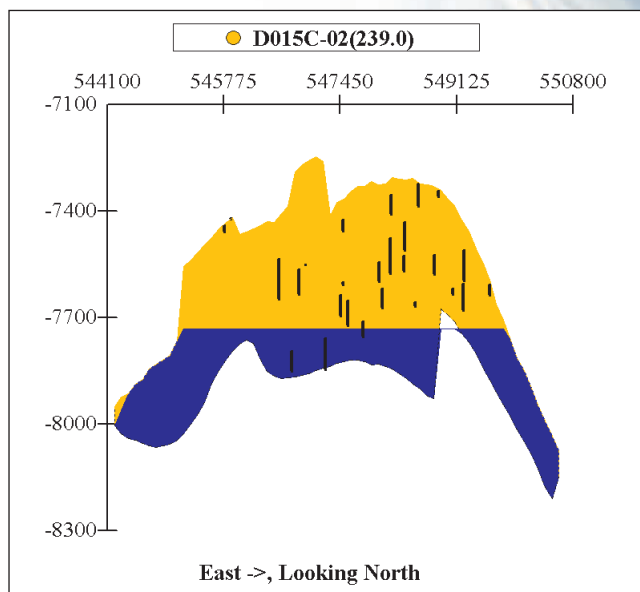
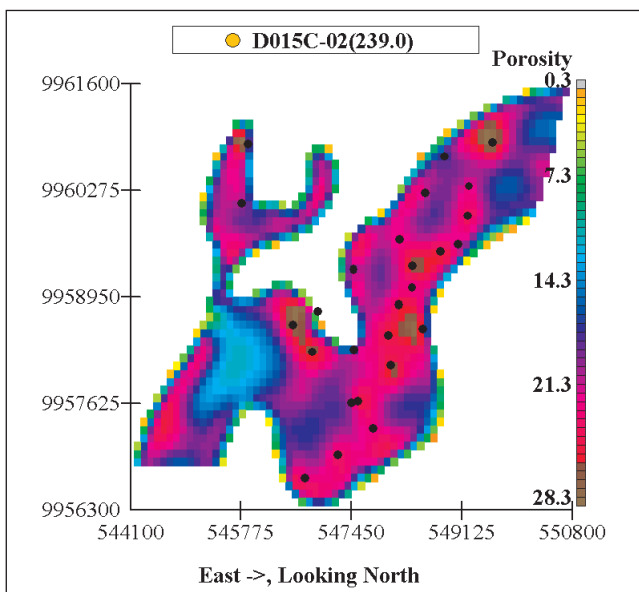
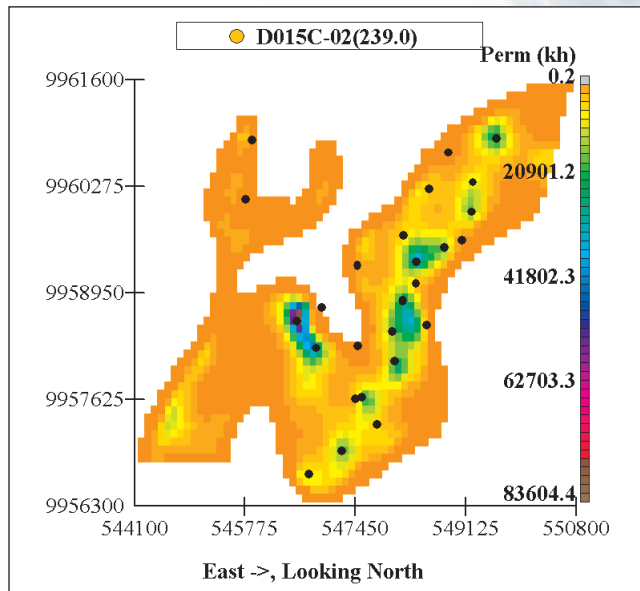
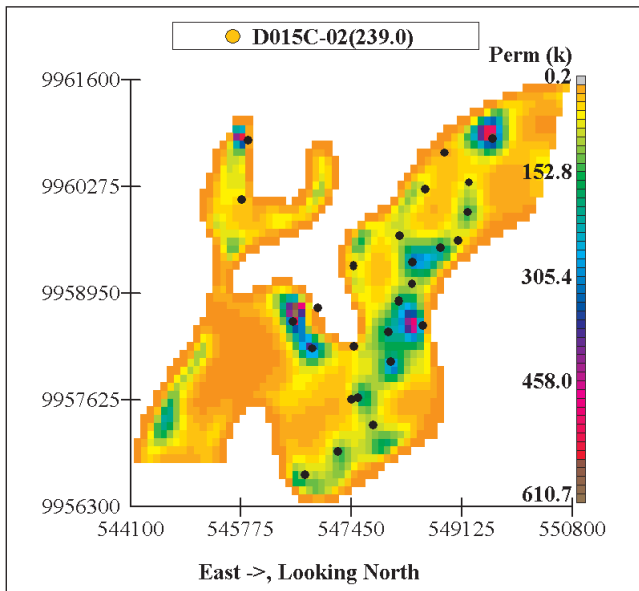
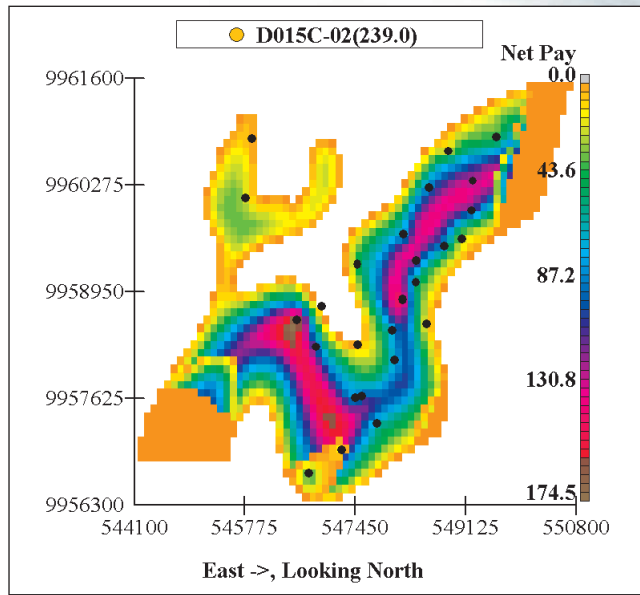
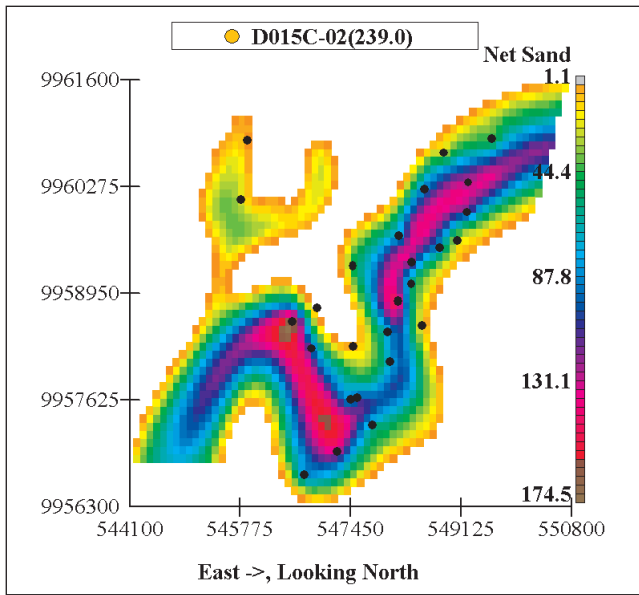
The surface network can show details of wells, flow stations or pipelines at any time step during prediction. This display shows the completion status of well DEM1800. It is a dual selective completion with two sliding sleeves open. Production rate, well head pressure and which compressor each string is producing into are also shown. Clicking the right or left arrow to a different time step will update the status of the well. The same is true for flow stations (manifolds) and compressor stations. Just click and the information is displayed.

FPM will also export detailed information to an Excel spreadsheet for the entire network or any other model parameter whether static or time step based.

FPM produces a wide range of plots that describe results of a prediction run. Some of them are exemplified by the field and well production plots below.



FPM also produces several “contouring” maps and plots of reservoir data;





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