It is probable that the sands were restricted to some degree by the cement and downhole equipment and that the resulting reservoir exposure is less than the total reservoir thickness.

As insights were gained from the initial simulations that were completed and more information became available from the investigation team, it was possible to converge on the inputs for further simulations to be completed. The main simulation runs that were completed are described in Section 3.6 (Early Simulations) and Section 3.7 (Final Simulations). In Section 3.6, the early simulations, a large net pay assumption of 86 ft was used and cases for flow through the production casing and through the production casing outer annulus were evaluated. In Section 3.7, the final simulations, net pay assumptions between 13 ft and 16.5 ft were used and most of the cases run were based on flow through the production casing via the casing shoe. In the simulations described in section 3.7, it was possible to achieve a good match with the recorded data using this relatively small range of net pay input assumptions. Achieving a simulation match to some of the recorded data, such as the arrival time of gas at surface and the pressure fluctuations recorded on the drill pipe after 21:30 hrs, proved to be quite sensitive to this narrow band of net pay input assumptions.

Constant net pay input assumptions were used for all of the simulations and it is acknowledged that varying net pay is probably more likely; this may explain some of the offsets between actual recorded data and the simulation results. However, the model results can be confidently utilized by the investigation team to test different well flow hypotheses when used in conjunction with other sources of information such as recorded real time data and witness accounts.

**Conclusions:**

The available evidence and simulation results strongly suggest that the initial flow path was through a leaking casing shoe and up through the inside of the casing. Using the input data collected by the investigation team, it was not possible to simulate flow through the outer annulus of the casing and match the recorded data and actual events witnessed. It was also clear that key points of reference such as a pressure increase during the sheen test could not be generated by flow through the outer annulus of the casing, the simulation shows a pressure decrease during this period of time rather than a pressure increase.

By using a net pay of between 13 ft and 16.5 ft and assuming flow via the casing shoe and through the production casing, a good simulation match for most of the actual events witnessed and data recorded can be achieved. Using a net pay of between 13 ft and 16.5 ft also seems realistic; it is less than 1/5th of the total productive sands in the well. The final simulation run which is based on these parameters, Case 7, is described in Section 3.7.8 of the report.

According to the simulations, the well became underbalanced at 20:52 hrs resulting in flow of hydrocarbons into the wellbore. Simulations show a total gain of around 40 bbls taken between 20:52 hrs and 21:08 hrs, a result supported by the gains calculated from recorded mud-pit data.