Question 35: For deep cut vacuum tower designs what is your experience with heater coking and typical run lengths? Are you using on-line cleaning (like coker heater spalling)?

MICHAEL KIMBRELL (Becht Engineering)

For a properly designed vacuum heater, it should be possible for the heater to last the entire run between cycle ending turnarounds without having to decoke the heater. This requires the heater to have been designed with the appropriate heat flux and mass flux rates. Velocity steam is typically used to maintain adequate velocity as the oil is heated and begins to vaporize.

Heater coking is very dependent on process film temperatures and residence time at temperature as well as coke precursor concentration. Heater coking is exponential with temperature and linear with time. Over firing the heater will accelerate heater coking and cause the heater to be decoked early. Modifying an existing unit to be a deep cut unit without modifying the heater to manage the higher duty will result in accelerated heater fouling. A heavier crude slate has a higher coke precursor concentration, so the heater fouling rate will be higher just by changing the crude slate. With a higher heat flux the process film temperature will be higher which will also increase heater fouling.

I have not heard of anyone performing an on-line spall of a vacuum unit heater. If that were done, the coke from the heater coils would enter the vacuum tower and would exit out the vacuum bottoms stream. These solids would have the opportunity to foul the stripping trays in the vacuum tower or to get stuck in the vacuum bottoms pumps. The reason on-line spalling works for Delayed Cokers is that the coke that is spelled out of the heater passes is routed to the coke drum where coke is collected and then removed from the process before the coke gets to the fractionator.