Question 1: Historically, instrument air was used to purge FCC reactor instruments. More recently, dry gas or nitrogen is typically used for this service. Please explain the reasons for moving away from air and provide examples of operating upsets that have occurred when using air to purge instruments.

ASDOURIAN (Sunoco Inc.)

Gas purge streams for instrumentation in FCCU reactor-regenerator service are required to ensure their functionality. For example, the reliability of level- and pressure-measuring devices relies on clear impulse lines. The utilization of a continuous-purge gas stream ensures that catalyst particles are prevented from entering or are swept from impulse lines to keep them clear and reliable. Typically, Sunoco FCCUs do not use an air purge stream for instruments in reactor service. We utilize fuel gas or nitrogen for purge in this service. Nitrogen is preferred since it is a dry stream and contains no sulfur. It is also preferred as a continuous emission monitoring and instrument purge for these aforementioned reasons.

Reactor-side instrument air purge has led to elevated phenol content in sour water. Phenol concentrations need to remain within river discharge or biological treatment process limits. We are not aware of any operating upsets of an acute nature when air is in use in reactor service. Instrumentation in regenerator service commonly utilizes air as a purge stream.

WALKER (UOP)

We used instrument air on early units with bubbling bed reactors. With the advent of all riser cracking and tee disengagers in the 1970s, localized coke accumulation became more common. We know of one North American FCC unit that suffered overheating of the reactor head caused by localized coke burn, which was oxidized by instrument air purges. On some units, a shotgun off the top of the tee was used to keep the top head of the reactor active and coke-free. And then as we went to more and more closed systems, dry gas or nitrogen was used as a purge.

WARDINSKY (ConocoPhillips)

We have not experienced any operational upsets due to instrument air purges in FCC reactor service. However, we have experienced problems with riser differential pressure taps using refinery gas purges in one FCC. This was due to heavy coke formation inside the pressure tap piping. An 18-inch coke ball was found on the outlet of one tap. The coking was believed to be partially due to hydrocarbon liquids present in the refinery gas. When switching to natural gas purges in FCC reactor service, proper start-up

procedures need to be in place to use nitrogen or instrument air when the reactor is being heated up for a refractory cure and dry-out.

PHILLIP NICCUM (KBR)

Using instrument air to purge FCC reactor instruments has not been a historical practice at KBR. One of the concerns can be that during extremely low feed rates, such as maybe during a start-up or a feed outage, you can have a buildup of oxygen in the top of the fractionator or the overhead drum, which can exceed the explosive limit. All these issues can be avoided by using an oxygen-free medium.

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