Question 24: How many refiners import and/or purchase gasoil feed for a hydroprocessing unit? What are common issues associated with imported or purchased gasoil feeds? Are there specific characteristics to target and / or avoid? Are there best practices for minimizing negative impacts to unit operations / reliability? How are supply limitations managed?

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Key characteristics of imported feed like end point, sulfur, nitrogen, chlorides and carbon residue can be controlled by establishing allowed specifications. But other characteristics may be hard to control. For example:

- It can be difficult to know the source of the feeds and the number of cracked feeds. Bromine number is generally not meaningful for gas oils, so the amount of olefins present may be uncertain. Hydrotreated coker gas oils may have relatively low sulfur and nitrogen content but all the remaining sulfur will be very difficult sulfur. If the import contains such feeds, it may be much more difficult to hydrotreat it than would be expected based on the feed assay.
- If feeds are imported via a barge or ship, they will likely have been exposed to air either before or during shipping. If the VGO tank on-site is not N2 blanketed, it will get exposed to more air in storage. Exposing cracked feeds to O2 or even mixing feeds containing dissolved O2 with cracked feeds will tend to form gums as the feed is heated up. This can lead to severe fouling of feed/effluent exchangers, furnaces and catalyst in reactors.

Imported feeds will almost always be cold. If the hydroprocessing unit normally charges hot feed directly from upstream units, it may not easily be able to handle the cold feed. Charge rates may have to be reduced, especially when the catalyst gets to EOR. More ascending reactor temperature profiles may be required to get enough heat into the reactor and keep the hot separator at the desired temperature. If the hot separator temperature is reduced, the stripper or fractionator may operate colder, and it may not be possible to remove as much diesel and naphtha as normally done.

One good way to handle these issues is to install an O2 Stripper. The imported feed can be heated to a few hundred degrees with steam and then stripped above fuel gas pressure with a small amount of H2 or natural gas. The stripper overhead is sent to fuel gas and the bottoms are routed to the hydroprocessing unit. This provides warm feed and removes O2 to prevent fouling.

It is often preferred to send imported feeds directly to the FCCU which can probably handle them better than hydroprocessing units. But other considerations such as the need to make Tier III gasoline on the FCCU may mean imports need to be hydrotreated. If the refinery has multiple VGO hydroprocessing units, such as a cat feed hydrotreater and a hydrocracker, the imports can be sent to the unit most able to handle them. It is often better to send heavier gas oils to the FCCU via the cat fed hydrotreater and lighter gas oils to the hydrocracker. Heat balance issues may mean that one unit can handle cold feeds

better than another. If there is no O2 Stripper, consideration should be given to which unit can better tolerate gums and which unit you would prefer to bring down to clean exchangers if it became necessary. For example, if the consequence of having to take an unplanned shutdown on the hydrocracker was higher, it may be better to route the imports to the cat feed hydrotreater.

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