



A PROFESSIONAL CONSULTING FIRM SERVING THE ENERGY, CHEMICAL, AND RELATED INDUSTRIES WORLDWIDE

BABY BREAK IT DOWN, PART 3 - STAFFING REFINERIES AND PETROCHEMICAL FACILITIES IN A TIME OF SOCIAL DISTANCING

May 21, 2020

COVID-19 has created a number of challenges across the energy value chain, including lower demand for motor gasoline and jet fuel and, subsequently, surplus crude oil. However, even with diminished demand, the facilities that produce and process these fuels have to keep operating at some level, as do petrochemical plants. Workers in the energy industry are considered essential due to the importance of having fuel available to power vehicles and manufacturing facilities, natural gas to enable continued operation of power industries, and logistical infrastructure to ensure that feedstock supply can make it to processing facilities and eventually consumers. Given the need for round-the-clock operations, COVID-related social distancing measures have presented a unique challenge for refinery and petrochemical facilities. To maintain adequate staffing while protecting personnel from the coronavirus, these facilities have been making major adjustments. If, as we all hope, things begin moving back toward “normal” in the coming months and refinery and petchem utilization ramps up, these efforts to keep workers safe will only gain in significance. Today, we discuss staffing issues in these key industry sectors during the pandemic.

In recent weeks, we have all heard about the challenges that another essential sector of the U.S. economy — the meat-processing industry — has faced regarding COVID, resulting in plant shutdowns and beef, pork and chicken shortages, not to mention the health impacts to the workers themselves. Refineries and petrochemical plants must also deal with similar personnel issues while already reeling from the blow dealt to demand. RBN has blogged extensively over the past couple of months about the upheavals that the COVID pandemic has caused in just about every nook and cranny of the energy industry. In *One Thing Leads to Another and Can't Get Enough of It*, we examined the big changes happening in the market for all NGLs, including ethane and propane — the two most important feedstocks for U.S. steam crackers. For crude oil, the factors affecting the U.S. supply and demand balance were discussed in *How Much More Can I Take*. On the supply side, we looked at the impact of shut-ins in last week's *Shut Down*. On the demand front, Part 1 and Part 2 of this series on refineries looked at the various approaches that refineries have been taking to reduce their overall throughput. Figure 1, below, shows just how underutilized North American refining capacity is currently with the dashed red boxes identifying cutbacks specifically attributable to COVID.

In today's episode of our “Baby Break It Down” series, we will describe how refineries and petrochemical plants are normally staffed and then turn our attention to the special measures that many such facilities are implementing to help maintain operations while ensuring that their plant personnel stay healthy and available for work.



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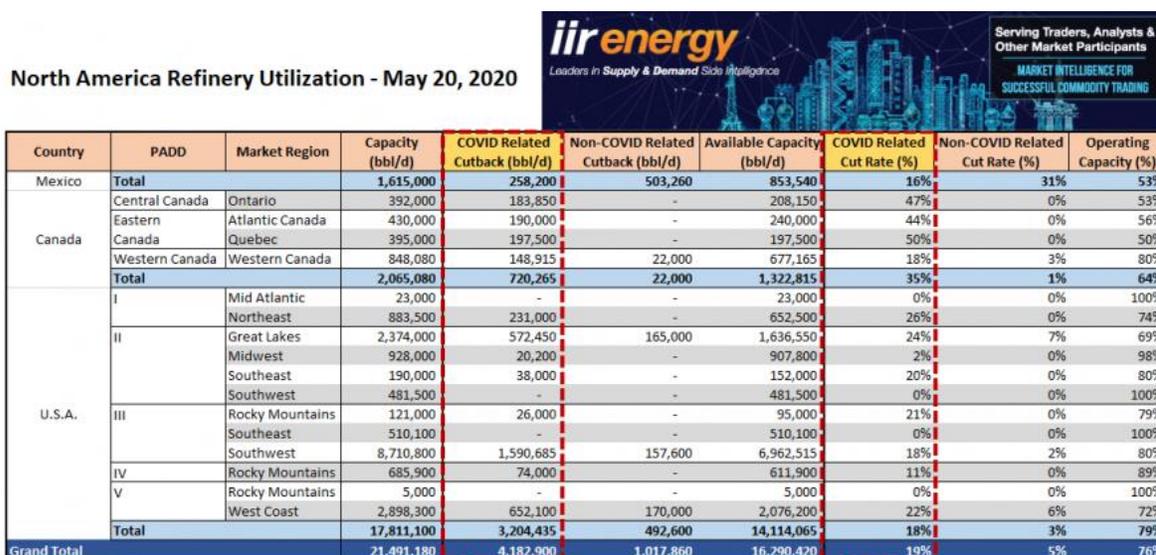


Figure 1. North America Refinery Utilization. Source: IIR

Staffing Structure of Refinery and Petrochemical Facilities

Refineries and petchem plants, such as steam crackers, are highly complex industrial facilities that require a large, extensively trained staff in order to ensure safe, continued operation. These plants typically operate around the clock without interruption, seven days a week, and are only shut down when there is a physical problem (such as equipment failure), an impending threat of a hurricane, or a planned maintenance event, typically referred to as a “turnaround” or “maintenance outage.” Refineries and petrochemical plants have a variety of front-line employees that are trained in specific areas of expertise. The two largest groups on the front line are the operators and craftsmen who operate and maintain the facility 24/7.

The Operations Team is essentially divided into two distinct groups. One group, typically referred to as “console or board operators,” is ultimately responsible for the plant’s operation through the use of the computer control system that monitors and controls operating pressures, temperatures, flow rates, liquid levels, etc. These are all managed from inside a building called the control room, which is pressurized to prevent any toxic or combustible gasses from entering the building. Another group, referred to as “field operators,” is responsible for the physical monitoring of plant equipment such as pumps, compressors, heat exchangers, towers, drums, tanks, etc., which is conducted outdoors or “in the field.” Then there are Craftsmen, including pipefitters, scaffold builders, pump mechanics and a number of other disciplines. These personnel maintain a facility’s equipment and fix any issues that might arise.

Key to maintaining safe and efficient operations is close and frequent interaction among and within the operations team and the craftsmen group, and the coordination and communications hub of a facility is commonly the control room. For example, field operators will spend time in the control room for breaks; to discuss operating strategies, issues and plans with the board operators; and to discuss maintenance work that is active or about to begin in the field. Traditionally, these discussions are conducted at a table in the control room near the computer console so the board operators can



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participate in the discussion while monitoring and making adjustments to the computers that control the facility. Craftsmen, in turn, will go into the control room to meet with the operators regarding work that is scheduled for that day or work that may emerge unexpectedly throughout the day and night. Similar to the discussions between the field operators and the board operators, meetings between craftsmen and operators typically occur at a table near the computer console. Other interactions that typically occur in the control room throughout the day involve process engineers and equipment engineers who are working on problems, projects or enhancements. In addition, it is not uncommon for truck drivers to come in the control room to get permission to enter the facility, to obtain a vehicle permit or to request assistance to deliver goods such as specialty chemicals, equipment and supplies.

Control room configurations can vary depending on the size of the facility and operations strategy of the owner. Some facilities have small, independent control rooms that focus on one or a few operating units, such as — in a refinery — an atmospheric and vacuum crude distillation unit or a delayed coker and its associated gas plant. Typically, two to three board operators will be assigned to one of these control rooms, and a handful of field operators will interact with them in the control room. In the examples above, there might be a total of approximately six to 10 operators sharing the same space, again depending on the size and configuration of the refinery and the individual process units.

Many other facilities have converted to the concept of a “centralized control room.” This configuration provides a remote location to house board operators away from the process units. Some believe that having all of the refinery board operators together in one room results in better face-to-face communication between and among the various process unit operations.

In the central control room configuration, field operators are often housed in small satellite control rooms that are located in close proximity to the process unit so they can quickly access and monitor the process equipment. Because they are closer to the equipment, these satellite control rooms must be built to blast-resistant standards in case of emergency. In this type of layout, the satellite control room might have two to four operators, and the central control room might have 10 to 30 or more. Satellite control rooms are typically small, making it difficult to maintain much spacing between personnel.

As noted earlier, the refineries operate around the clock, so the operators work on shifts and the size of the group depends on the size of the facility and the control room configuration. The design of shift schedules varies by company. Some operate in a traditional eight-hour schedule (e.g., 7 a.m. to 3 p.m., 3 p.m. to 11 p.m., and 11 p.m. to 7 a.m.). There are also 12-hour shift schedules and others that consist of shifts with a multitude of durations. But in all cases, it is traditional for the on-duty shift to conduct a detailed meeting with the in-coming shift, commonly referred to as a “shift relief meeting” or “shift change meeting.” This meeting is conducted to discuss activities, issues or concerns that arose during the ending shift or that are expected on the upcoming shift. The effectiveness of these meetings is important to the safe and efficient operation of the facility.

Now that we’ve gone through the typical categories of employees within a facility, control room structures, and shift designs, we throw COVID into the mix. Companies have reacted in a variety of ways and to varying degrees of intensity. For example, some companies are changing the type of schedule they use in order to reduce the number of shift changes and the number of interactions.



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Along those lines, we have heard that, in order to limit contact between shifts, some maintenance schedules have now been revised to 13 hours a day, three days a week. Additionally, some companies have imposed rules that, when conducting shift relief meetings at the plant, the meeting will occur outside of the control room and with participants at a safe physical distance from each other. Some are also requiring that off-duty operators refrain from interacting with operators from other shifts when they are outside of the plant. Still others are screening employees by taking everyone’s temperatures as they come in the gate. And some have implemented contact-tracing programs to mitigate the spread of coronavirus during any mini-outbreak at the facility.

Refineries and chemical plant operations are extremely complex and include a large variety of process units that require different skill sets and extensive training for operators. The process units are typically integrated in such a way that the shutdown of any one unit can force the shutdown or slowdown of other units. If multiple operators on any one unit are exposed to COVID and are forced to quarantine, companies will face tough decisions on how to manage ongoing critical operations. To date, a few instances of COVID exposure have been publicly reported within facilities (Figure 2).

Media Reported Cases of COVID-19 at Refineries and Petrochemical Facilities

Facility	Date	Source
Marathon Los Angeles	13-Mar-20	US News
Valero Meraux	20-Mar-20	Hydrocarbon Processing
Lime Tree Bay St. Croix	23-Mar-20	Hydrocarbon Processing
BASF Geismar	24-Mar-20	The Advocate
Denka Performance Elastomer La Place	24-Mar-20	The Advocate
Dow Chemical Plaquemine	24-Mar-20	The Advocate
Motiva Port Arthur Chemicals	27-Mar-20	Motiva
BP Whiting	1-Apr-20	NWI Times
CVR Coffeyville	1-Apr-20	Montgomery County Chronicle
Valero Port Arthur	7-Apr-20	Reuters
Total Port Arthur	7-Apr-20	Total
ExxonMobil Baytown	11-Apr-20	Reuters

Figure 2. Reported Cases of COVID at Refineries and Petrochemical Facilities. Source: Baker & O’Brien research.

Note: This list only incorporates publicly reported cases of COVID at facilities and is not meant to be exhaustive.

Another challenge facing the industry in this unprecedented situation is how to handle maintenance, turnaround and capital projects. Given that product inventories are high and increasing, companies have reduced rates and, in some cases, shut down completely. If a facility has sufficient storage to allow continued operation, they have to decide how much ongoing/routine maintenance is necessary to keep the facility safe and reliable and then staff accordingly. If poor economics, lack of storage or other issues lead to a full shut down, they are faced with yet another decision, namely, should they use the time to perform maintenance or other work that otherwise would not be possible without a planned outage.



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There's a COVID angle to this too, though. The personnel that typically staff turnarounds have specialized skills required to perform this work and often travel from location to location around the country. Some companies have taken the position that maintenance and turnarounds are essential and are allowing contractors to perform the work, but this can carry a risk of startup delay if a worker or group of workers becomes ill and require quarantining. Other companies have made the decision to suspend all non-critical maintenance work and are trying to utilize only their company routine maintenance craftsmen, in lieu of travelers. They are requiring, of course, that all work permit activities occur at recommended "social distance" spacing, which is extremely difficult to accomplish given the nature of the work.

And yet another twist to consider is that when a facility has been shut down, restart activities typically are staffed with considerably higher numbers of operating and maintenance personnel than during normal operation. While only two facilities have been reported to have shut down to date in the U.S., many more have been shut down internationally. In most cases, during restart, a facility will be staffed with extra operators, often more than double the normal staffing levels and they also typically bring in extra craftsmen to support the startup effort. With the U.S. now beginning the initial phases of re-opening, there are already signs that demand for transportation fuels and consumer products are increasing and some plants have begun allowing an increased number of contractors back onsite. But there is a concern among many in the industry as to whether plants could be faced with situations where there are strong economic incentives to restart a unit before adequate personnel are available.

There is now a cautious balancing act where operators must consider effective ways to protect their workers while resuming activity. Like other sectors, there is a lot of uncertainty about what happens next in these unprecedented times. The ones that come out on the other side of all this will be those who prioritize safety and are prepared to react to any additional challenges that come their way.

Note: The article was authored by David Huffman of Baker & O'Brien and published on RBN Energy's Daily Energy Post on May 21, 2020.

"Baby Break It Down" was written by Mick Jagger and Keith Richards and appears as the 13th song on The Rolling Stones' 22nd American studio album, Voodoo Lounge. Recorded between September 1993 and April 1994 at Ronnie Wood's house in Ireland and Windmill Lane Studios in Dublin, the album was released in July 1994.

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