**Supply Chain Emergency Assignment**

**Background**

Your team is the operations planning group for supply chain operations for CPG North America (CPGNA). Your company is owned by a very large multinational firm that recently acquired another company with a well-known set of brands and has placed those brands under CPGNA planning and control. Along with those brands came two manufacturing facilities, one located in Los Angeles, CA and the other in Wilmington, NC, and two large distribution centers located on the premises of the two plants.

The rest of the CPGNA supply chain network consists of three other plants with their own DCs, which act as regional DCs for the Big Girl Hair® product line. One is in Stamford, CT, another is in Kansas City, MO, and the third is in San Francisco, CA (that plant does not have a manufacturing facility associated with it). The Wilmington NC distribution center is the central DC. It does not ship directly to customers. It only ships to the regional DCs.

One of the product lines inherited by your company is a very popular hair spray line called Big Girl Hair ® that has 6 SKUs: 7oz. Big Hair pump spray, 12 oz. Big Hair pump spray, 7 oz. Scary Big Hair pump spray, 12 oz. Scary Big Hair pump spray, 7 oz. Ludicrously Big Hair pump spray, and 12 oz. Ludicrously Big Hair pump spray. These six SKUs are being produced in the LA and Wilmington plants and distributed from their DCs.

Although these are all good sellers, they have been losing market share to your main competitor, BIGHAIRCO, which has recently launched a product line of pump hair sprays under the brand Lollypophead ®. Your marketing department has gotten nervous (they do that) and decided to relaunch the Big Girl Hair ® line of products. Normally that would not be a big deal. You would just plan ahead, produce product to a forecast while you are selling out all the old product, and ship the new product on the ship-to-trade date. Sure there will be some problems because the forecasts will be wrong, but it should not be that big a transition- your company does it all the time.

But this time the geniuses at the company that owns CPGNA have decided to save some money. The way they plan to do that is two-fold. First, they are shutting down the LA plant and DC since the plant in Wilmington produces the same products as LA does and there is already a DC in California. Secondly, to take advantage of a tax break U.S. companies get for making products in Puerto Rico and shipping them into the U.S., the parent company has directed CPGNA to just mold and label the bottles in Wilmington, send them to San Juan, have the San Juan plant fill and package the bottles and send them to Wilmington, which will serve as a central DC for these products and send inventory to the other DCs as determined by the DRP system.

No problem. Your excellent operations planners have laid out a schedule for blow molding and labeling the bottles, sending them to San Juan for filling, and shipping them to Wilmington, as well as shipment schedules from Wilmington to the other DCs, leaving plenty of time to meet the ship-to-trade date.

**Problem Statement:**

Today’s date is October 31, 2022. The ship-to-trade date is January 1, 2023. Your Wilmington plant has been producing bottles for two months, but in order to save shipping costs they have been sending carloads of bottles by rail to Miami, where they have been stored in a warehouse that is not air-conditioned, until there are enough bottles to fill twenty containers. This gives the company a good shipping discount from the container ship company. The bottles were finally shipped to Puerto Rico. Upon receipt of the containers it was quickly discovered that not any of the bottles could be used. The bottles are very hot when they come off the blow molder, and are reheated when the labels are applied. To save money the bottles were not hand-packed, but instead were allowed to fall off the end of the line, while still very hot, into a box that was then sealed and palletized. The labels have a wax base, and if not allowed to cool, or at least hand packed using cardboard between the bottles, the bottles will rub against each other. That was not a problem when they stayed in the same location for filling, but a combination of the rail trip, a hot warehouse, and the ocean voyage all conspired to ruin every single bottle that was shipped.

You now must figure out how to make the ship-to-trade date and keep both your customers and your senior management happy. Somehow YOU will be blamed if the ship-to-trade date is not met.

**Data:**

Forecasts for Finished Goods (*each of the six SKUs is expected to sell approximately equally*):

January- Stamford DC: 300,000 units are needed on 1/1/2023; another 300,000 by 1/15/2023.

Kansas City DC: 200,000 units are needed on 1/1/2023; another 200,000 by 1/15/2023.

San Francisco DC: 300,000 units are needed on 1/1/2023; another 300,000 by 1/15/2023.

February- Stamford DC: 275,000 units are needed on 2/1/2023.

Kansas City DC: 200,000 units are needed on 2/1/2023.

San Francisco DC: 250,000 units are needed on 2/1/2023.

March- Stamford DC: 200,000 units are needed on 3/1/2023.

Kansas City DC: 125,000 units are needed on 3/1/2023.

San Francisco DC: 200,000 units are needed on 3/1/2023.

April: Stamford DC: 200,000 units are needed on 4/1/2023.

Kansas City DC: 125,000 units are needed on 4/1/2023.

San Francisco DC: 200,000 units are needed on 4/1/2023.

Bottle blowing and labeling capacity (line runs 24 hrs./day, 7 days a week): 200,000 units/week

Line filling capacity (*You are free to use any combination of the three fillers you want, plus overtime when needed*):

Demonstrated at Wilmington: 21,000 units/day running three shifts. Normal production is Monday-Friday. Saturday production can be scheduled at 1.5 times hourly rate. Sunday production can be scheduled at 2 times hourly rate. There are 8 people on the production line making $12.50/hr.

Estimated at San Juan: 15,000 units/day running three shifts. Normal production is Monday-Friday. Saturday production can be scheduled at 1.5 times hourly rate. Sunday production cannot be scheduled. There are 8 people on the production line making $7.50/hr. Each unit produced in San Juan is eligible for a $.05 tax break from the U.S. government.

Estimated at Smartfill (third party filler located in Wilmington): 20,000 units/day running three shifts. Normal production is Monday-Friday. Saturday production can be scheduled at 1.5 times hourly rate. Sunday production can be scheduled at 2 times hourly rate. There are 8 people on the production line making $10.50/hr. Smartfill charges $.08/unit to produce one bottle, plus labor costs.

Shipping Costs and Times:

*Empty Bottles*:

Rail to Miami, ship to San Juan: $.02/unit. 7 days. This is based on a container of 100,000 units.

Truck to Miami, ship to San Juan: $.03/unit. 4 days. This is based on a container of 100,000 units.

Truck to Wilmington port, ship to San Juan: $.025/unit. 5 days. This is based on a container of 100,000 units.

Truck to Raleigh-Durham airport, air to San Juan: $.07/unit. 1 day. This is based on a container of 25,000 units.

*Finished Product (All finished goods are to be shipped from the Wilmington DC to other DCs or directly to customers)*:

Ship to Miami, rail to Wilmington DC: $.04/ unit. 7 days.

Ship to Miami, truck to Wilmington DC: $.06/unit. 4 days.

Ship to Wilmington, truck to Wilmington DC: $.05 unit. 5 days.

Air to Raleigh-Durham airport, truck to Wilmington DC: $.25/unit. 1 day.

Shipping Times from Wilmington DC to Other DCs (*only trucks will be used to move finished goods*):

To Stamford: Truck- 1 day.

To Kansas City: 3 days.

To San Francisco: 7 days.

**Your Assignment:**

*Part One:*

Develop a plan that starts on October 31st which includes the following:

A blow molding schedule for each week through February 28th. The March schedule can be for the whole month.

A production schedule at each filler each week. You may choose which fillers you want to use each week.

A bottle shipment schedule, including quantities shipped by each route, to San Juan for each week through February 28th. The March schedule can be for the whole month. There do not need to be shipments if no production is scheduled in a particular week.

A finished goods transportation schedule for each trip from San Juan to Wilmington for the weeks you fill in Puerto Rico. Indicate which route you are taking.

A finished goods transportation schedule from Wilmington to the other DCs each week. The March schedule can be for the whole month.

This plan must satisfy all forecasts and due dates. It also has to be the least total cost plan in order to satisfy management.

**You must show all of your calculations.**

*Part Two:*

Your marketing department is planning a similar product relaunch of its popular shampoos for July 1, 2023. The shampoo bottle molding and filling can be done at any of the plants in your supply chain, or can be outsourced to Smartfill. You should have the new formulas and graphics ready by March 1st and components should be ready for production April 1st. Discuss in detail what you learned from this relaunch that you plan on using for the next one. This will just be a strategy of how you approach the relaunch, not actual schedules of blow molding, filling, and shipping.