Harvard Business School

9-673-033
Rev. February 29, 1984

Blanchard Importing and Distributing Co., Inc.

After his first year at the Harvard Business School, Hank Hatch accepted summer employment with Blanchard Importing and Distributing, a Boston firm that dealt in the processing and wholesaling of alcoholic beverages. Early in June 1972 Hank met with Toby Tyler, the company's general manager, who was a recent graduate of the Harvard Business School. Toby described the initial tasks that he wanted Hank to perform:

> Hank, during your first few days at Blanchard, I'd like you to become familiar with the general scope of operations of the firm. As you investigate our various product lines, I think you will find that the most rapidly expanding demand for alcoholic beverages is in the wine market. At the present time we estimate that we can earn a before-tax return of 20% on any money we put into wine merchandising. However, to date, Carmen Petrillo, our Wine Division manager, and Dave Rubin, the Sales Department manager, have been unable to exploit this trend due to lack of funds needed to hire experienced wine salesmen and build up an adequate inventory of wines. Here is a recent balance sheet which shows that we have just about reached the limit of our borrowing capability [see *Exhibit 1*]. It appears that a reduction in inventory level is the only substantial source of funds available to us. That's where you come in.
>
> After you've become acquainted with our operations, I'd like you to spend some time analyzing the inventory situation and recommend ways in which we can economize in that area. Initially, you can look into the method we use in scheduling production runs of those beverages which we bottle ourselves. The current scheduling system, which was initiated in October 1969, calls for bottling of an Economic Order Quantity (EOQ) of an item when the stock level of that item falls below a fixed Reorder Point (ROP). This Reorder Point trigger level is equal to $3^1/_2$ weeks' worth of the average weekly demand throughout the year ending October 31, 1969. I suspect that many of the EOQ and ROP quantities calculated in 1969 should be recalculated based on changes in annual demand over the past $2^1/_2$ years. As a first assignment you can update the EOQ and ROP figures. While you're at it, keep thinking about ways in which we can reduce expenses and cut back on unnecessarily high stock levels—any cash which can be made available for wine merchandising will be greatly appreciated by Carmen and Dave.

This case was prepared as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. The data presented in the case have been disguised.

Product Lines

During the first week of June, Hank learned that Blanchard was a full-line alcoholic beverage house that distributed both imported and domestic goods including wine, beer, distilled spirits, cordials, and premixed cocktails. Blanchard purchased prebottled goods (called *uncontrolled stock*) for resale to retail outlets at wholesale prices. Uncontrolled stock accounted for 45% of the firm's annual sales. The remaining 55% of Blanchard's revenue was attributed to sale of *controlled stock,* those items that Blanchard bottled and sold under its own brands and private labels.

In June 1972 controlled stock consisted of 158 products that Blanchard processed in its own bottling facility. These 158 items were differentiated by bottle size, type and proof of beverage, and brand label. Blanchard produced 25 items in half gallons, 63 in quarts, 42 in fifths, 12 in pints, and 16 in half-pints.

Company History

The Blanchard name was originally established as a chain of retail liquor stores, the first of which was opened in 1938 by John D. Corey. In 1957 Corey became interested in wholesaling alcoholic beverages and began distributing case goods to retail outlets. To devote his full efforts to this new venture, Corey transferred ownership of the chain of Blanchard retail outlets to other members of his family. In 1964 the present warehouse and office facility was completed, and in 1966, equipment was installed to permit the conversion of raw bulk spirits to bottled goods for sale under the firm's own brands and private labels. When Corey died in 1968, his son, John D. Corey, Jr., assumed responsibilities as president and treasurer of the company. In June 1972, the firm's annual revenue was $4 million, of which $3 million represented sales to the seven Blanchard retail stores owned by other members of the Corey family.

Warehouse Layout

Figure A depicts the layout of the Blanchard warehouse. Most of the warehouse space was set aside for stocks of bottled case goods. These areas included a large margin for future growth; actual finished goods inventories had never occupied more than 50% of the reserved space. In addition to the areas set aside for storage of finished case goods, space was occupied by two U.S. bonded warehouses and the rectification and bottling equipment used for processing controlled stock. The government required that all products imported by Blanchard, including both prebottled goods and raw bulk spirits, enter the Blanchard facility by way of the Customs bonded warehouse. In addition, all the raw bulk spirits that Blanchard purchased for processing in its bottling operation were required to pass through the IRS bonded warehouse prior to rectification. The flow of goods into and out of the two bonded warehouses was closely monitored by federal officials to insure that the required tax and customs duty obligations were met by the company.

Converting Raw Bulk Spirits into Bottled Goods

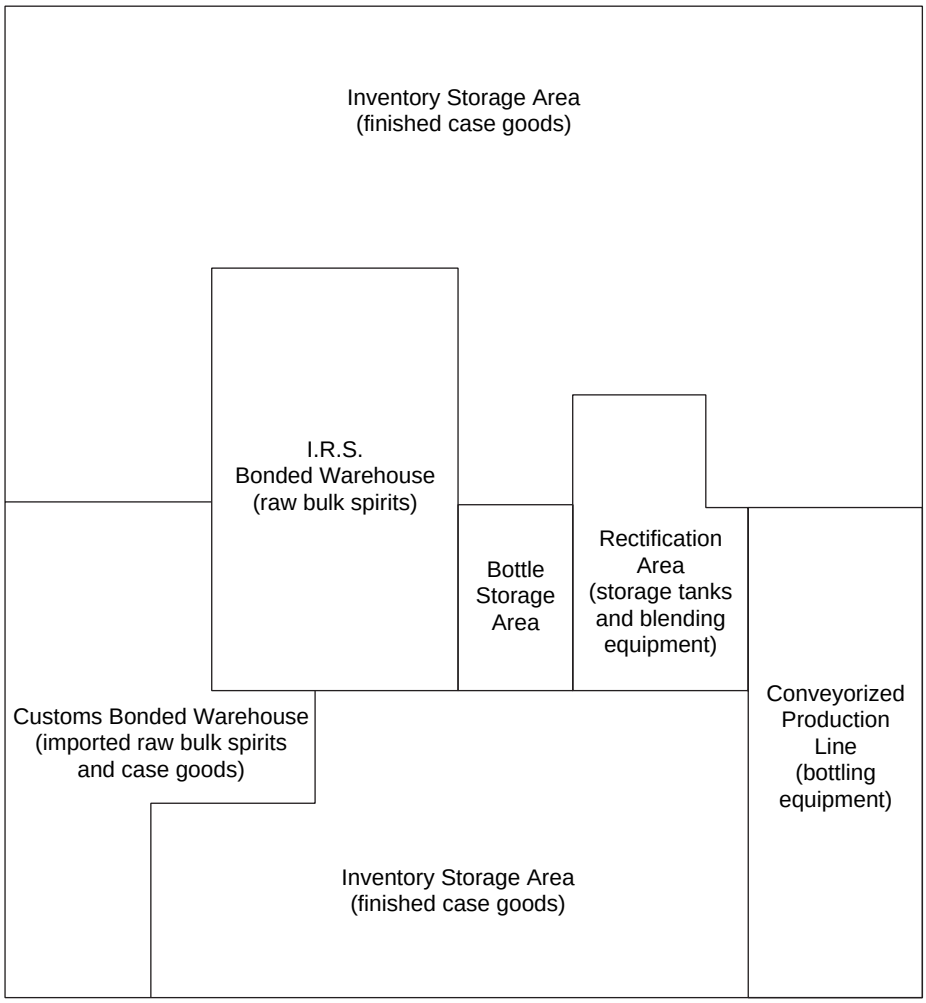
In preparation for his first assignment, Hank made a thorough study of the method used by Blanchard to process controlled stock. Hank learned that two salaried employees, Bob Young and Eliot Wallace, were in charge of this operation. Bob Young, a skilled machinery operator, had worked for Blanchard since 1969, and Eliot Wallace, a chemistry expert with a degree in food technology, had worked for Blanchard for seven years. The combined annual wages of these two employees amounted to $23,000. Bob and Eliot explained that the conversion process followed three steps: (1)

withdrawal of raw spirits from bulk storage, (2) rectification of the spirits, and (3) bottling the finished product.

Withdrawal from Bulk Storage

Raw bulk was purchased by the barrel and stored either in the Customs warehouse or the IRS warehouse depending on whether the spirits were imported or domestic. When a bottling run called for use of a particular type of raw bulk, Bob and Eliot withdrew the spirits from one of the two bonded warehouses and pumped it into mixing tanks for rectification; imports were withdrawn from the Customs warehouse via the IRS warehouse, incurring both a customs duty and federal distilled spirits tax liability, while domestic spirits incurred only the federal distilled spirits tax liability upon withdrawal from IRS warehouse storage.

Figure A Warehouse Layout



Rectification

Rectification of withdrawn bulk consisted of diluting the spirits with distilled water to attain the desired proof, mixing several different types of spirits to form combinations such as blended whiskey, and adding nonalcoholic ingredients to yield cocktails such as screwdrivers and whiskey sours. Eliot Wallace was responsible for performing chemical tests on each rectified beverage to

verify that the appropriate ratio of ingredients had been established before releasing the beverage to the bottling line.

Bottling

The bottling operation utilized a fully automated conveyorized line of equipment including machines that filled each bottle, screwed on a cap, attached a brand label, and affixed the government seal protecting the consuming public against unauthorized opening of a container following bottling. Since 1966 the demand for controlled stock items had required operation of the bottling line less than one out of every three available working days. Bob Young was responsible for maintenance and repair of this equipment and verified the setup of each machine prior to initiating a bottling run.

Bob Young and Eliot Wallace worked together in completing all preparations for a bottling run, including the withdrawal and rectification of spirits and the setup of the bottling equipment for each size and label combination. When preparations were complete, Bob and Eliot were joined by five part-time workers drawn from the local area who were each paid $2.50 per hour. While Bob and Eliot supervised overall operations of the bottling line, these five laborers packed filled bottles into cartons, labeled and stamped each carton with appropriate information, and stacked the cartons on pallets for transfer to the controlled stock case goods storage area. The five temporary laborers were paid soon after completion of the bottling run.

Tax and Customs Duty Considerations

It was the practice at Blanchard to delay withdrawal of bulk spirits from storage in the two bonded warehouses until just before the start of a bottling run to avoid incurring tax and custom duty liabilities earlier than necessary. Consequently, the length of time between withdrawal of bulk spirits from storage and transfer of the bottled product to finished case goods storage never exceeded one week.

In addition to the federal distilled spirits tax and customs duty charge, two other taxes were levied against alcoholic beverages: a federal rectification tax was incurred during blending of certain items, depending on the mixing process, and a state tax was incurred upon sale of the finished product by Blanchard. Federal and state regulations required the company to pay the customs duty charge, federal rectification tax, and state tax within a few days after these liabilities were incurred. Payment of the federal distilled spirits tax, however, was not required until one month after sale.

EOQ-ROP Scheduling System

Before making corrections to the EOQ and ROP figures for each of the 158 items bottled by Blanchard, Hank located the documents showing how the formal scheduling system was developed in 1969. These records, which are reproduced in *Exhibit 2,* indicate the general method used to determine EOQ and ROP quantities for each Blanchard product. During his review of the system, Hank made the following observations about the inputs to the EOQ calculations.

Setup Costs, S

Blending setup cost was based on the annual salaries of Bob Young and Eliot Wallace and the length of time required for these men to withdraw the appropriate spirits from bulk storage and complete rectification for a given item.

Size changeover cost equaled the cost of resetting all machinery for a change in bottle size divided by the average number of different items of a given size processed between size changeovers. The cost of resetting all machines for a change in bottle size was based on the annual salaries of Bob and Eliot and the fact that it took these two men one full day to complete all the machinery adjustments required for a size changeover. In a typical year, Blanchard operated the bottling line for 77 days during the year. The bottling equipment was adjusted approximately 35 times during the year for a change in bottle size; however, an average of 10 different items of a given bottle size were processed between size changeovers, resulting in about 350 separate item-bottling runs during the year.

Label changeover cost was based on the average length of time that the bottling line was shut down to change from one label to another label of a same bottle size. This idle time was assumed to be 30 minutes, consisting of 20 minutes to reset the labeling machine and 10 minutes to restore the labeling machine to continuous error-free operation following the change in labels. Since the part-time bottling laborers remained idle during the label changeover, the cost of this 30 minutes of down-time was based on both the hourly wage rate of these five workers and the annual salaries of Bob and Eliot.

Order-processing cost equaled the yearly cost of two office workers who earned a combined annual salary of $18,000 divided by the total number of separate item-bottling runs per year. These two clerks worked full-time processing the customs duty forms, federal tax forms, state tax forms, and other paperwork required to support the bottling operation.

Unit Cost, C

Blanchard used a standard form titled *Cost and Price Data* to determine the wholesale price per case of each item. This price was based on a full unit cost figure that included all direct expenses incurred in producing and selling an item plus an allocation of the company's total fixed expenses. Since the state tax liability was not incurred until sale of the finished product, the unit cost used in the EOQ formula was determined by deducting the state tax from the full unit cost figure shown on the Cost and Price Data form.

Carrying Cost Percentage, K

The only substantial component of the inventory carrying cost was the cost of capital. Equity was not considered as a source of funds since all common stock was privately held by John D. Corey, Jr., who wished to maintain full control of the company. As a result, the cost of capital was assumed to be 9%, the prevailing interest rate for debt available to Blanchard. Components of the carrying cost percentage other than cost of capital were small and amounted to only 2.5%.

Scheduling System Used

Hank decided to make his first corrections to EOQ and ROP figures for the items to be produced during an upcoming bottling run. He learned that Bob and Eliot planned to bottle the items described in *Table A* during the last week in June.

Hank then located the Cost and Price Data forms and the original EOQ and ROP calculation sheets for these five items and summarized the data in tabular form (see *Exhibits 3* and *4*). Hank compared the annual demand for the year ending October 31, 1969 (see *Exhibit 4*) with the monthly sales summary report for the fiscal year ending January 31, 1972 (see *Exhibit 5*) and noted significant

shifts in demand between the years ending October 1969 and January 1972, especially for the MacCoy & MacCoy Scotch and Ron Cores Rum products.

Table A

Item (in quarts)	Number of Cases	
	On Hand as of June 20, 1972	To be Bottled
Blanchard's 80 proof Vodka	144	1,000
Blanchard's 80 proof Gin	55	600
MacCoy & MacCoy 86 proof Scotch	54	60
Triple 7 86 proof Blended Whiskey	301	120
Blanchard's 80 proof Ron Cores Rum	45	50

On June 21 Hank finished recalculating the EOQ and ROP figures and decided to find out how the schedule for the upcoming bottling run had actually been determined. He found Bob and Eliot in the blending area, where they were withdrawing corn spirits from the IRS warehouse prior to rectification of Triple 7 Blended Whiskey, and questioned them about the schedule.

Hank: How did you decide on these particular items for next week's run, Bob?

Bob: Well, every week the computerized inventory control system issues us a card for each item that has dropped below the $3^1/_2$-week ROP stock level. As of yesterday, we had several half-gallon and quart items which have dropped below their ROP levels, including the vodka and gin quart products scheduled for bottling next week.

Hank: Why don't you bottle both the half-gallon and quart items next week?

Bob: It takes Eliot and me just about one full day to make all the adjustments to the bottling equipment required for a size change. Consequently, we limit each bottling run to a single size and process several combinations of beverages and labels in that size during the run. Since quarts are our most popular size, we plan to bottle only quarts next week. We'll try to make a run of half-gallons in three weeks. Hopefully, the $3^1/_2$-week advance notice will keep us from stocking-out of any half-gallon items.

Hank: What about the rum, whiskey, and Scotch quart products; how did they get added to the schedule?

Eliot: After we decided to bottle quarts based on the low gin and vodka inventories, we checked the stock level for each of the remaining 61 quart items. We're going to try to make a run of quarts every four weeks for the next two months. So the June 20 stock level of any quart item which we *don't* schedule for bottling next week has to last at least six weeks until the following run is completed at the end of July. The stocks of MacCoy Scotch, Triple 7 Whiskey, and Ron Cores Rum were all below the six-week level when we checked yesterday, so we added them to the list.

Hank: How do you minimize the length of time that the line is idle when you shift from one item to another?

Eliot: We process the lighter beverages first so that we can switch from one item to the next with only a few bottles of distilled water in between to rinse the bottling machine. As a result, the bottling machine is ready after about only eight minutes of rinsing. We have sixteen tanks for storing rectified beverages prior to bottling with a combined volume equivalent to 10,000 cases of half-gallons, quarts, pints, or half-pints. This is more than enough storage capacity for all items scheduled for a single bottling run. Since Bob and I finish rectification of all beverages during the week before a scheduled bottling run, all items are ready when the schedule calls for bottling to

begin. No adjustment for bottle shape is necessary since we only run one size at a time and each size has a standard shape. That leaves label changeover as the controlling item—right, Bob?

Bob: Yes, every time we shift from one item to the next, I have to adjust the labeling machine and load in a stack of labels for the new item. This takes about 20 minutes, and during that time, the five part-time workers are idle. Once in a while the labels for two items in a row are the same shape, which permits me to make the change in about three minutes. At any rate, Eliot usually finishes purging the bottling machine and completes the shift to the new blending storage tank well before I have the labeling machine ready to resume bottling.

Hank: Once you have decided on the items you intend to bottle and the order in which you intend to bottle them, how did you determine the number of cases of each item to process? Did you use the EOQ figure that was calculated in 1969 when the scheduling system was originally developed?

Bob: Not exactly, Hank. Since we'll probably be bottling quarts every four weeks for a while, we tried to predict what the demand for each item will be between runs; then we took into account the inventory on hand and scheduled production of enough cases to last until the next scheduled bottling run for quarts.

Hank: How did you go about predicting what the demand for each item will be?

Bob: We used the data from the monthly sales summary [see *Exhibit 5*] to see what the demand was last month. Then we adjusted this May 1972 sales figure by adding a safety factor to offset any difference between sales in May and July.

Hank: Then the planned production volume for each of the five items scheduled for bottling next week represents your predicted demand for July, with an adjustment made for the current inventory on hand?

Bob: Yes, except for the gin and vodka. We're finding it difficult to predict accurately demand for these two items because sales are up substantially from last year. So we've decided to bottle enough gin and vodka to last us *two* months, through the end of August. If our predicted sales volumes for gin and vodka are correct, we can omit production of these products during the July bottling run of quarts and save the cost of blending and label changeover for these two items. However, if demand continues to spiral and exceeds our prediction, we can add these items to the July schedule and avoid a stock-out.

The day after Hank's discussion with Bob Young and Eliot Wallace, Toby Tyler asked Hank to report on what he had accomplished on his first assignment and to recommend appropriate action based on his findings. Hank realized that the scheduling system in use bore little resemblance to the formal EOQ-ROP system developed in 1969. In preparation for his meeting with Toby, Hank decided to evaluate the disadvantages of both the original scheduling system and the system developed by Bob and Eliot. Based on this analysis, Hank thought that he could determine if improvements could be made that would warrant adoption of one of the two systems on a permanent basis.

Exhibit 1 Balance Sheet, January 31, 1972 ($ thousands)

Assets		**Equity**	
Current assets		Current liabilities	
Cash	$24	Payroll withheld	$1
A/R (net)	483	Unsecured notes payable	809
Inventory[a]	1,050	Accounts payable	173
Prepaid expenses	32	Federal distilled spirits taxes payable	337
Total current assets	1,589	Accrued taxes	40
		Accrued expenses	11
Fixed assets		Total current liabilities	1,371
Plant and equipment net of depreciation	287	Long-term debt	64
		Total liabilities	1,435
Registered trademarks	8	Stockholders' equity	
Total fixed assets	295	Capital stock	100
		Retained earnings	349
Total assets	$1,884	Total equity	$1,884

a. Inventory was subdivided into the following categories (in cases):

Finished case goods (uncontrolled stock)	311
Finished case goods (controlled stock)	362
Customs bond (raw bulk and uncontrolled finished case goods stock)	171
IRS bond (raw bulk)	175
Miscellaneous (bottles, cartons, labels, flavors, etc.)	31

Exhibit 2 EOQ and ROP Calculations

$$EOQ = \sqrt{\frac{2RS}{CK}} \qquad ROP = \frac{3.5}{52} \times R$$

Where:

Annual demand, R:

Demand for an item for year ending October 31, 1969, in cases of bottles

Setup cost, S:

Setup cost per bottle run of an item

S = Blending setup cost + size changeover cost + label changeover cost + order processing cost

Blending setup cost = Actual cost of labor for blending during rectification and is different for each item

Size changeover cost = Actual cost of labor to reset all machines for a change in bottle size and is a constant $8.85 for all 158 items

Label changeover cost = Average cost of labor to reset labeling machine for a change in labels and is a constant $11.78 for all 158 items

Order processing cost = Average cost of administrative labor to process an order for a bottling run and is a constant $51.43 for all 158 items

Unit cost, C:

Cost per case of bottles of an item after bottling and packaging

C = Materials cost + bottling labor + fixed overhead allocation + variable overhead + customs duty + federal distilled spirits tax + federal rectification tax

Materials cost = Cost of raw bulk, bottles, caps, and labels

Bottling labor = Cost of part-time bottling line labor per case of bottles produced and is a constant $0.10 per case for all 158 items

Fixed overhead allocation = Total company fixed overhead for the year divided by the number of cases sold per year and is a constant $1.31 per case for all 158 items

Variable overhead = Total direct expense (other than material and direct labor costs) resulting from production of one case of an item and is a constant $0.50 per case for all 158 items

Customs duty = Charge on imported spirits and varies with the alcoholic content of the beverage

Federal distilled spirits tax = IRS tax on all spirits sold in the United States and varies with the alcoholic content of the beverage

Federal rectification tax = IRS tax on certain mixed beverages and varies with the alcoholic content of the item

Carrying cost percentage, K:

Percent of average inventory value which represents annual cost of carrying inventory of an item

K = Cost of capital + other carrying costs

Cost of capital = 9% for all items

Other carrying costs, including estimated costs of obsolescence, shrinkage, insurance, and year-end inventory tax = 2.5% for all items

Exhibit 3 Cost and Price Data Summary (dollars per case)

	Blanchard's 80 Proof Vodka	Blanchard's 80 Proof Gin	MacCoy & MacCoy 86 Proof Scotch	Triple 7 86 Proof Blended Whiskey	Blanchard's 80 Proof Ron Cores Rum
Wholesale price	$43.99	$43.99	$57.39	$49.87	$47.39
Materials—beverage	.93	1.08	4.46	2.52	2.74
Materials—packaging	1.27	1.27	1.27	1.27	1.27
Direct labor	.10	.10	.10	.10	.10
State tax	10.08	10.08	10.08	10.08	10.08
Federal distilled spirits tax	25.20	25.20	27.09	27.09	25.20
Federal rectification tax				.76	
Customs duty			1.55		
Variable overhead	.50	.50	.50	.50	.50
Fixed overhead allocation	1.31	1.31	1.31	1.31	1.31
Full unit cost	39.39	39.54	46.36	43.63	41.20
Profit before income tax	4.60	4.45	11.03	6.24	6.19

Exhibit 4 EOQ and ROP Calculation Sheet Data

	Blending Setup Cost	All Other Setup Costs	Total Setup Cost (S)	Annual Demand (R)	% Carrying Cost (K)	Unit Cost C[a]	EOQ $\sqrt{\frac{2RS}{CK}}$	ROP $[\frac{3.5}{52} \times R]$
Blanchard's 80 proof Vodka	$1.15	$72.06	$73.21	2,455	11.5%	$29.31	327	165
Blanchard's 80 proof Gin	1.08	72.06	73.14	1,421	11.5	29.46	248	96
MacCoy & MacCoy 86 proof Scotch	3.24	72.06	75.30	800	11.5	36.28	170	54
Triple 7 86 proof Blended Whiskey	2.62	72.06	74.68	3,096	11.5	33.55	346	208
Blanchard's 80 proof Ron Cores Rum	2.33	72.06	74.39	449	11.5	31.12	137	30

a. Unit cost (C) = Full unit cost (see *Exhibit 3*) minus state tax (see *Exhibit 3*)

Exhibit 5 Monthly Sales Data, February 1971–May 1972

	Cases of Quart Bottles												
	Feb.	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Year Total**
Blanchard's 80 proof Vodka													
1971	128	136	233	219	284	343	368	230	162	246	252	114	2,715
1972	210	303	275	463									
Blanchard's 80 proof Gin													
1971	51	52	74	157	150	257	179	83	72	89	181	42	1,387
1972	166	142	133	213									
MacCoy & MacCoy 86 proof Scotch													
1971	79	82	151	66	127	96	85	61	67	103	131	39	1,087
1972	82	68	66	38									
Triple 7 86 proof Blended Whiskey													
1971	163	180	198	183	217	207	186	171	205	266	257	654	2,887
1972	177	163	162	256									
Blanchard's 80 proof Ron Cores Rum													
1971	10	34	44	26	33	35	51	16	15	26	43	22	355
1972	11	28	61	55									