| From: | Lalich, Joanna [joanna.lalich@walgreens.com] |
| :--- | :--- |
| Sent: | $3 / 27 / 20092: 07: 58$ PM |
| To: | Morris, Tracy A. [tracy.morris@walgreens.com] |
| CC: | Martin, Barbara A. [barb.martin@walgreens.com]; Yelvington, Ora M. [ora.yelvington@walgreens.com]; Khanna, |
|  | Rakesh [rakesh.khanna@walgreens.com]; Bamberg, Stephen M. [stephen.bamberg@walgreens.com]; Bancroft, |
|  | Wayne E. [wayne.bancroft@walgreens.com] |
| Subject: | Re: Revised Suspicious Order Document |
| Attachments: | order_size and frequency_dea.doc; order_size and frequency_dea_EDITS.doc |

Thanks Tracy. Please see the edited document:

Joanna and Barb

## Tracy Morris/Corp/Walgreens

03/27/2009 09:17 AM

To Joanna Lalich/Corp/Walgreens@Walgreens, Barb Martin/Corp/Walgreens@Walgreens, Wayne Bancroft/Corp/Walgreens@Walgreens<br>cc Stephen Bamberg/Corp/Walgreens@Walgreens, Ora Yelvington/Corp/Walgreens@Walgreens, Rakesh Khanna/Corp/Walgreens@Walgreens<br>Subject Revised Suspicious Order Document

Please review the Suspicious Order DEA Compliance Summary document which we have revised based on the discussio ns in our meeting last week. There are some highlighted portions that need verified as either acceptable/changes, please CC this distribution list with any revisions needed in preparation for the larger group meeting on Monday.

Thanks

## Compliance Status of Controlled Substances by Order Size

Orders of controlled substances will be monitored and evaluated based on its order size when compared to upper tolerance limits established for each item. Orders requested move with the trend of customer demand. It is assumed that since order sizes placed with the DCs to meet customer demand are normally distributed with a fixed average and that these orders can be measured by how widely its size is dispersed from the average order size. The upper tolerance limit which will be calculated each week by item using 52 weeks of data is used to determine if the item is suspicious or should be sent as requested from the store.

Orders that are flagged as suspicious will be intercepted and the order quantity will be reduced to a level which is not considered to be an outlier when compared to other orders within its history. This will prevent the suspicious orders from being sent and filled by the DCs.

An additional criterion to review in the process is to examine if any inventory adjustments was made within the week the order was requested. If there were no inventory adjustments or if it was less than a package size then the order will be considered to have no significant inventory adjustments. The next factor to determine the final compliance status of the item ordered are to review the store's requested order quantity against both the system generated suggested quantity and the upper tolerance limit.

If the store requested order amount is above the suggested order size and is above the tolerance limit then it will be flagged as suspicious and the tolerance limit amount will be sent to the DC.

All other orders without significant inventory adjustments made will not be flagged as suspicious.
If the store requested order amount is above the suggested order size but below or equal to the tolerance limit then the store requested order amount will be sent to the DC.

If the store requested order is less than or equal to the suggested order size then the store requested order will be shipped even if that amount is over the tolerance limit.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule. Please review Case 1 below which displays possible scenarios for items ordered that had no significant inventory adjustments.

Case 1 No Substantial Inventory Adjustments


If an item ordered had a recent history of inventory adjustments, the amount allowed to be shipped will never be more than the tolerance limit and all orders will be flagged as suspicious.

When the store requested order is less than the suggested order size and is less than the tolerance limit then the store's requested order will be shipped and will not be flagged as a suspicious order

If the store's requested order amount is equal to the suggested order size but is more than the tolerance limit then it will be flagged as suspicious and the tolerance limit will be sent to the DC . If the stores requested order amount is equal to the suggested order size but is less than the tolerance limit the store requested quantity will be sent to the DC.

When the store requested order size is greater than the suggested order size but is equal to the tolerance limit then the tolerance limit will be shipped to the DC. If the store requested order size is greater than the suggested order size but is less than the tolerance limit then the store requested amount is shipped.

If a store requested order is less than the system suggested quantity and is more than the tolerance level then only the tolerance limit will be shipped. If the store requested order is less than both the system suggested quantity and tolerance level then the store requested quantity is shipped.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule. Please review Case 2 below which displays possible scenarios for items ordered that had significant inventory adjustments

Case 2 Inventory Adjustments


## Compliance Status of Controlled Substances by Order Frequency

If two consecutive orders are generated relatively close together in comparison to past history it may be considered suspicious. In order to monitor the order frequency of controlled substances, the order history will be used as the basis to establish the minimum acceptable number of periods between orders ( j ). If the number of periods between orders is less that the acceptable control limit then the order is flagged as suspicious.

Typically the total number of order periods available in a year is 104 for twice per week ordering stores and 52 for once per week ordering stores.

The first step in determining the acceptable number of weeks between orders is to estimate the probability ( P ) that an order will be requested in a given period. The probability becomes the number of orders periods placed divided by the total number of order periods available.

Using the probability that an order will be requested, we can determine the cumulative probability that the next order will be placed less than or equal to a specific number of periods. This cumulative probability is used to determine the minimum period (j) between orders (see example in the Appendix).

If the period between the current order and the previous order is greater than the minimum number of periods allowed, the order is not considered suspicious and the order quantity which is outlined in the Compliance for Order Quantity will be sent.

## New Items

New items ordered will use the cumulative probability to determine the minimum acceptable period between orders for identifying suspicious orders after 6 weeks. Any orders requested prior to those 6 weeks will use $-? ?$ $\qquad$ as its minimum period between orders to be compared.

By tracking the current orders, its preceding order and evaluating this against its order history's time span between the current and preceding order it can be stated with $98 \%$ confidence that we will not flag an order as suspicious when it is acceptable. The inverse result is that $2 \%$ of orders flag as suspicious are in fact not suspicious. The combination of the Order Quantity and Order Frequency for both Case 1 and Case 2 are displayed in the tables below.

## Case 1 - No Substantial Inventory Adjustments (Please review)

If the number of periods between two consecutive orders was less the control limit (j) and the item was not a system suggested order, it is flagged as suspicious and the amount ordered will not be shipped. Orders that are flagged as suspicious will not be included in the calculated cumulative probability order history and suspicious orders flagged will have a reason code with the associated record which explains the violated business rule.

However, if it was a system suggested order quantity it will not be flagged (if you agree with this then we need to change the " Y " in the Case I tables below to " N ") as suspicious per order frequency (See table below).

Case 1 No Substantial Inventory Adjustments
m

## Case 2 - Inventory Adjustments (Please review)

If the number of periods between two consecutive orders was less the control limit (j) and the item was not a system suggested order, it is flagged as suspicious and the amount ordered will not be shipped. Orders that are flagged as suspicious will not be included in the calculated cumulative probability order history.

However, if it was a system suggested order quantity it will be flagged as suspicious per order frequency and the quantity sent will be lower of either the suggested order quantity or the tolerance limit.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule.

Case 2 Inventory Adjustments

| Siewinio | 4y SM <br> Sig\% <br> 4rther |  | KWlerinus <br> Smil | Shum <br> OHIIIIS | 12989018. 314 <br> 苜 HH CiOH | 4hy OUl/4: <br> III $\mathrm{H} \\| \mathrm{H}=$ <br> Kuspiciont <br> SV Whindige <br> OUles <br>  <br> OH Le s <br> $\Downarrow \stackrel{y}{2} /$ |  | (ommuent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | 2 | 5 | 4 | 4 | Y | Y | 2 |  |
| 2. | 0 | 5 | 4 | 4 | Y | Y | 0 |  |
| 3. | 2 | 3 | 4 | 3 | N | Y | 2 |  |
| 4. | 3 | 3 | 4 | 3 | N | Y | 3 |  |
| 5. | 6 | 6 | 4 | 4 | Y | Y | 4 |  |
| 6. | 6 | 3 | 4 | 3 | N | Y | 4 |  |
| 7. | 0 | 3 | 4 | 3 | N | Y | 0 |  |
| 8. | 0 | 4 | 4 | 4 | N | Y | 0 |  |
| 9. | 4 | 4 | 4 | 4 | N | Y | 4 |  |
| 10. | 6 | 5 | 4 | 4 | Y | Y | 4 |  |

## Appendix - Order Frequency

|  |  |  |  |  | Prob next order will be placed in week $n$ or sooner |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No Order Periods (N) | Number of orders in last $N$ ordering periods | P | Q | Periods Between Orders @ (98\%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 104 | 1 | 0.01 | 0.99 | 2 | 0.010 | 0.019 | 0.029 | 0.038 | 0.047 | 0.056 | 0.065 | 0.074 |
| 104 | 2 | 0.02 | 0.98 | 1 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 104 | 3 | 0.03 | 0.97 | 0 | 0.029 | 0.057 | 0.084 | 0.110 | 0.136 | 0.161 | 0.185 | 0.209 |
| 104 | 4 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 104 | 5 | 0.05 | 0.95 | 0 | 0.048 | 0.094 | 0.137 | 0.179 | 0.218 | 0.256 | 0.292 | 0.326 |
| 52 | 1 | 0.02 | 0.98 | 1 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 52 | 2 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 52 | 3 | 0.06 | 0.94 | 0 | 0.058 | 0.112 | 0.163 | 0.212 | 0.257 | 0.300 | 0.340 | 0.378 |
| 52 | 4 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 52 | 5 | 0.10 | 0.90 | 0 | 0.096 | 0.183 | 0.262 | 0.333 | 0.397 | 0.455 | 0.507 | 0.555 |
| 26 | 1 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 26 | 2 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 26 | 3 | 0.12 | 0.88 | 0 | 0.115 | 0.217 | 0.308 | 0.388 | 0.458 | 0.521 | 0.576 | 0.625 |
| 26 | 4 | 0.15 | 0.85 | 0 | 0.154 | 0.284 | 0.394 | 0.487 | 0.566 | 0.633 | 0.689 | 0.737 |
| 26 | 5 | 0.19 | 0.81 | 0 | 0.192 | 0.348 | 0.473 | 0.574 | 0.656 | 0.722 | 0.776 | 0.819 |


|  |  |  |  |  | Prob next order will be placed in week $n$ or sooner |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No Order <br> Periods (N) | Number of orders in last N ordering periods | P | Q | Periods Between Orders@ (95\%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 104 | 1 | 0.01 | 0.99 | 5 | 0.010 | 0.019 | 0.029 | 0.038 | 0.047 | 0.056 | 0.065 | 0.074 |
| 104 | 2 | 0.02 | 0.98 | 2 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 104 | 3 | 0.03 | 0.97 | 1 | 0.029 | 0.057 | 0.084 | 0.110 | 0.136 | 0.161 | 0.185 | 0.209 |
| 104 | 4 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 104 | 5 | 0.05 | 0.95 | 1 | 0.048 | 0.094 | 0.137 | 0.179 | 0.218 | 0.256 | 0.292 | 0.326 |
| 52 | 1 | 0.02 | 0.98 | 2 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 52 | 2 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 52 | 3 | 0.06 | 0.94 | 0 | 0.058 | 0.112 | 0.163 | 0.212 | 0.257 | 0.300 | 0.340 | 0.378 |
| 52 | 4 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 52 | 5 | 0.10 | 0.90 | 0 | 0.096 | 0.183 | 0.262 | 0.333 | 0.397 | 0.455 | 0.507 | 0.555 |
| 26 | 1 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 26 | 2 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 26 | 3 | 0.12 | 0.88 | 0 | 0.115 | 0.217 | 0.308 | 0.388 | 0.458 | 0.521 | 0.576 | 0.625 |
| 26 | 4 | 0.15 | 0.85 | 0 | 0.154 | 0.284 | 0.394 | 0.487 | 0.566 | 0.633 | 0.689 | 0.737 |
| 26 | 5 | 0.19 | 0.81 | 0 | 0.192 | 0.348 | 0.473 | 0.574 | 0.656 | 0.722 | 0.776 | 0.819 |

## Compliance Status of Controlled Substances by Order Size

Orders of controlled substances will be monitored and evaluated based on its order size when compared to upper tolerance limits established for each item. Orders requested move with the trend of customer demand. It is assumed that since order sizes placed with the DCs to meet customer demand are normally distributed with a fixed average and that these orders can be measured by how widely its size is dispersed from the average order size. The upper tolerance limit which will be calculated each week by item using 52 weeks of data is used to determine if the item is suspicious or should be sent as requested from the store.

Orders that are flagged as suspicious will be intercepted and the order quantity will be reduced to a level which is not considered to be an outlier when compared to other orders within its history. This will prevent the suspicious orders from being sent and filled by the DCs.

An additional criterion to review in the process is to examine if any inventory adjustments was made within the week the order was requested. If there were no inventory adjustments or if it was less than a package size then the order will be considered to have no significant inventory adjustments. The next factor to determine the final compliance status of the item ordered are to review the store's requested order quantity against both the system generated suggested quantity and the upper tolerance limit.

If the store requested order amount is above the suggested order size and is above the tolerance limit then it will be flagged as suspicious and the tolerance limit amount will be sent to the DC.

All other orders without significant inventory adjustments made will not be flagged as suspicious.
If the store requested order amount is above the suggested order size but below or equal to the tolerance limit then the store requested order amount will be sent to the DC.

If the store requested order is less than or equal to the suggested order size then the store requested order will be shipped even if that amount is over the tolerance limit.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule. Please review Case 1 below which displays possible scenarios for items ordered that had no significant inventory adjustments.

Case 1 No Substantial Inventory Adjustments

| Scenario | System Sugg. Order | Store Adjusted Order | Tolerance Limit | Shipped Quantity | Flag Order <br> Suspicious | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | 2 | 5 | 4 | 4 | Y |  |
| 2. | 0 | 5 | 4 | 4 | Y |  |
| 3. | 2 | 3 | 4 | 3 | N |  |
| 4. | 3 | 3 | 4 | 3 | N |  |
| 5. | 6 | 6 | 4 | 6 | N |  |
| 6. | 6 | 3 | 4 | 3 | N |  |
| 7. | 0 | 3 | 4 | 3 | N |  |
| 8. | 0 | 4 | 4 | 4 | N |  |
| 9. | 4 | 4 | 4 | 4 | N |  |
| 10. | 6 | 5 | 4 | 5 | N | - |

If an item ordered had a recent history of inventory adjustments, the amount allowed to be shipped will never be more than the tolerance limit. And aAll orders exceeding the tolerance limit will be flagged as suspicious.

When the store requested order is less than the suggested order size and is less than the tolerance limit then the store's requested order will be shipped and will not be flagged as a suspicious order

If the store's requested order amount is equal to the suggested order size but is more than the tolerance limit then it will be flagged as suspicious and the tolerance limit will be sent to the DC . If the stores requested order amount is equal to the suggested order size but is less than the tolerance limit the store requested quantity will be sent to the DC.

When the store requested order size is greater than the suggested order size but is equal to the tolerance limit then the tolerance limit will be shipped to the DC. If the store requested order size is greater than the suggested order size but is less than the tolerance limit then the store requested amount is shipped.

If a store requested order is less than the system suggested quantity and is more than the tolerance level then only the tolerance limit will be shipped. If the store requested order is less than both the system suggested quantity and tolerance level then the store requested quantity is shipped.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule. Please review Case 2 below which displays possible scenarios for items ordered that had significant inventory adjustments

Case 2 Inventory Adjustments

| Scenario | System Sugg. Order | Store Adjusted Order | Tolerance Limit | Shipped Quantity | Flag Order Suspicious | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | 2 | 5 | 4 | 4 | Y |  |
| 2. | 0 | 5 | 4 | 4 | Y |  |
| 3. | 2 | 3 | 4 | 3 | N |  |
| 4. | 3 | 3 | 4 | 3 | N |  |
| 5. | 6 | 6 | 4 | 4 | Y |  |
| 6. | 6 | 3 | 4 | 3 | N |  |
| 7. | 0 | 3 | 4 | 3 | N |  |
| 8. | 0 | 4 | 4 | 4 | N |  |
| 9. | 4 | 4 | 4 | 4 | N |  |
| 10. | 6 | 5 | 4 | 4 | Y |  |

## Compliance Status of Controlled Substances by Order Frequency

If two consecutive orders are generated relatively close together in comparison to past history it may be considered suspicious. In order to monitor the order frequency of controlled substances, the order history will be used as the basis to establish the minimum acceptable number of periods between orders (j). If the number of periods between orders is less that the acceptable control limit then the order is flagged as suspicious.

Typically the total number of order periods available in a year is 104 for twice per week ordering stores and 52 for once per week ordering stores.

The first step in determining the acceptable number of weeks between orders is to estimate the probability (P) that an order will be requested in a given period. The probability becomes the number of orders periods placed divided by the total number of order periods available.

Using the probability that an order will be requested, we can determine the cumulative probability that the next order will be placed less than or equal to a specific number of periods. This cumulative probability is used to determine the minimum period (j) between orders (see example in the Appendix).

If the period between the current order and the previous order is greater than the minimum number of periods allowed, the order is not considered suspicious and the order quantity which is outlined in the Compliance for Order Quantity will be sent.

## New Items

New items ordered will use the cumulative probability to determine the minimum acceptable period between orders for identifying suspicious orders after 6 weeks. Any orders requested prior to those 6 weeks will not use [??? as its a minimum period between orders, until one can be established after 6 weeks to be compared.

By tracking the current orders, its preceding order and evaluating this against its order history's time span between the current and preceding order it can be stated with $98 \%$ confidence that we will not flag an order as suspicious when it is acceptable. The inverse result is that $2 \%$ of orders flag as suspicious are in fact not suspicious. The combination of the Order Quantity and Order Frequency for both Case 1 and Case 2 are displayed in the tables below.

## Case 1 - No Substantial Inventory Adjustments (Please review)

If the number of periods between two consecutive orders was less the control limit ( j ) and the item was not a system suggested order, it is flagged as suspicious and the amount ordered will not be shipped. Orders that are flagged as suspicious will not be included in the calculated cumulative probability order history and suspicious orders flagged will have a reason code with the associated record which explains the violated business rule.

However, if it was a system suggested order quantity it will not be flagged (if you agree with this then we need to change the "Y" in the Case 1 tables below to " N ") as suspicious per order frequency. The quantity sent will be lower of either the suggested order quantity or the store adjusted order quantity.
-(See table below).

Case 1 No Substantial Inventory Adjustments

| Scenario | System <br> Sugg. <br> Order | Store <br> Adjusted <br> Order | Tolerance Limit | Shipped Quantity | Flag Order Size Suspicious | Flag Order <br> Frequency <br> Suspicious <br> System Sugg. <br> Order <br> or Store Adjusted <br> Order <br> $\mathbf{P}<=\mathbf{j}$ | Flag Order <br> Frequency <br> Suspicious <br> Shipped <br> System Suggested <br> or Store Adjusted <br> Order <br> $\mathrm{P}<=\mathrm{j}$ | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | 2 | 5 | 4 | 4 | Y | +2N | 2 |  |
| 2. | 0 | 5 | 4 | 4 | Y | Y | 0 |  |
| 3. | 2 | 3 | 4 | 3 | N | Y? | 2 |  |
| 4. | 3 | 3 | 4 | 3 | N | Y 2 | 3 |  |
| 5. | 6 | 6 | 4 | 6 | N | Y2N | 46 |  |
| 6. | 6 | 3 | 4 | 3 | N | Y ${ }^{\text {N }}$ | 43 |  |
| 7. | 0 | 3 | 4 | 3 | N | Y | 0 |  |
| 8. | 0 | 4 | 4 | 4 | N | Y | 0 |  |
| 9. | 4 | 4 | 4 | 4 | N | Y N | 4 |  |
| 10. | 6 | 5 | 4 | 5 | N | Y | 45 |  |

## Case 2 - Inventory Adjustments (Please review)

If the number of periods between two consecutive orders was less the control limit (j) and the item was not a system suggested order, it is flagged as suspicious and the amount ordered will not be shipped. Orders that are flagged as suspicious will not be included in the calculated cumulative probability order history.

However, if it was a system suggested order quantity it will be flagged as suspicious per order frequency and the quantity sent will be lower of either the suggested order quantity or the tolerance limit.

Each suspicious order flagged will have a reason code with the associated record which explains the violated business rule.

Case 2 Inventory Adjustments

| Scenario | System <br> Sugg. <br> Order | Store <br> Adjusted <br> Order | Tolerance Limit | Shipped Quantity | Flag Order Size Suspicious | Flag Order <br> Frequency <br> Suspicious <br> System Sugg. <br> Order <br> or Store Adjusted <br> Order $P<=j$ | Flag Order <br> Frequency <br> Suspicious <br> Shipped <br> System Suggested or Store Adjusted <br> Order $P<=j$ | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | 2 | 5 | 4 | 4 | Y | Y | 2 |  |
| 2. | 0 | 5 | 4 | 4 | Y | Y | 0 |  |
| 3. | 2 | 3 | 4 | 3 | N | Y | 2 |  |
| 4. | 3 | 3 | 4 | 3 | N | Y | 3 |  |
| 5. | 6 | 6 | 4 | 4 | Y | Y | 4 |  |
| 6. | 6 | 3 | 4 | 3 | N | Y | 4 |  |
| 7. | 0 | 3 | 4 | 3 | N | Y | 0 |  |
| 8. | 0 | 4 | 4 | 4 | N | Y | 0 |  |
| 9. | 4 | 4 | 4 | 4 | N | Y | 4 |  |
| 10. | 6 | 5 | 4 | 4 | Y | Y | 4 |  |

## Appendix - Order Frequency

|  |  |  |  |  | Prob next order will be placed in week $n$ or sooner |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No Order Periods (N) | Number of orders in last N ordering periods | P | Q | Periods Between Orders @ (98\%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 104 | 1 | 0.01 | 0.99 | 2 | 0.010 | 0.019 | 0.029 | 0.038 | 0.047 | 0.056 | 0.065 | 0.074 |
| 104 | 2 | 0.02 | 0.98 | 1 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 104 | 3 | 0.03 | 0.97 | 0 | 0.029 | 0.057 | 0.084 | 0.110 | 0.136 | 0.161 | 0.185 | 0.209 |
| 104 | 4 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 104 | 5 | 0.05 | 0.95 | 0 | 0.048 | 0.094 | 0.137 | 0.179 | 0.218 | 0.256 | 0.292 | 0.326 |
| 52 | 1 | 0.02 | 0.98 | 1 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 52 | 2 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 52 | 3 | 0.06 | 0.94 | 0 | 0.058 | 0.112 | 0.163 | 0.212 | 0.257 | 0.300 | 0.340 | 0.378 |
| 52 | 4 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 52 | 5 | 0.10 | 0.90 | 0 | 0.096 | 0.183 | 0.262 | 0.333 | 0.397 | 0.455 | 0.507 | 0.555 |
| 26 | 1 | 0.04 | 0.96 | 0 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 26 | 2 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 26 | 3 | 0.12 | 0.88 | 0 | 0.115 | 0.217 | 0.308 | 0.388 | 0.458 | 0.521 | 0.576 | 0.625 |
| 26 | 4 | 0.15 | 0.85 | 0 | 0.154 | 0.284 | 0.394 | 0.487 | 0.566 | 0.633 | 0.689 | 0.737 |
| 26 | 5 | 0.19 | 0.81 | 0 | 0.192 | 0.348 | 0.473 | 0.574 | 0.656 | 0.722 | 0.776 | 0.819 |


|  |  |  |  |  | Prob next order will be placed in week n or sooner |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No Order Periods (N) | Number of orders in last N ordering periods | P | Q | Periods Between Orders @ (95\%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 104 | 1 | 0.01 | 0.99 | 5 | 0.010 | 0.019 | 0.029 | 0.038 | 0.047 | 0.056 | 0.065 | 0.074 |
| 104 | 2 | 0.02 | 0.98 | 2 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 104 | 3 | 0.03 | 0.97 | 1 | 0.029 | 0.057 | 0.084 | 0.110 | 0.136 | 0.161 | 0.185 | 0.209 |
| 104 | 4 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 104 | 5 | 0.05 | 0.95 | 1 | 0.048 | 0.094 | 0.137 | 0.179 | 0.218 | 0.256 | 0.292 | 0.326 |
| 52 | 1 | 0.02 | 0.98 | 2 | 0.019 | 0.038 | 0.057 | 0.075 | 0.093 | 0.110 | 0.127 | 0.144 |
| 52 | 2 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 52 | 3 | 0.06 | 0.94 | 0 | 0.058 | 0.112 | 0.163 | 0.212 | 0.257 | 0.300 | 0.340 | 0.378 |
| 52 | 4 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 52 | 5 | 0.10 | 0.90 | 0 | 0.096 | 0.183 | 0.262 | 0.333 | 0.397 | 0.455 | 0.507 | 0.555 |
| 26 | 1 | 0.04 | 0.96 | 1 | 0.038 | 0.075 | 0.111 | 0.145 | 0.178 | 0.210 | 0.240 | 0.269 |
| 26 | 2 | 0.08 | 0.92 | 0 | 0.077 | 0.148 | 0.213 | 0.274 | 0.330 | 0.381 | 0.429 | 0.473 |
| 26 | 3 | 0.12 | 0.88 | 0 | 0.115 | 0.217 | 0.308 | 0.388 | 0.458 | 0.521 | 0.576 | 0.625 |
| 26 | 4 | 0.15 | 0.85 | 0 | 0.154 | 0.284 | 0.394 | 0.487 | 0.566 | 0.633 | 0.689 | 0.737 |
| 26 | 5 | 0.19 | 0.81 | 0 | 0.192 | 0.348 | 0.473 | 0.574 | 0.656 | 0.722 | 0.776 | 0.819 |

